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ABSTRACT

Presented are simple activities, experiments, and demonstrations relating to energy conservation in the home. Activities are divided into four areas: (1) kitchen, (2) house, (3) transportation, and (4) heating and cooling. The material has been designed to require a minimum of preparation. Activity and game masters are provided. Activities may be adapted to meet individual skill levels of students. Theory is presented to lead logically to practical applications. (Author/RE)

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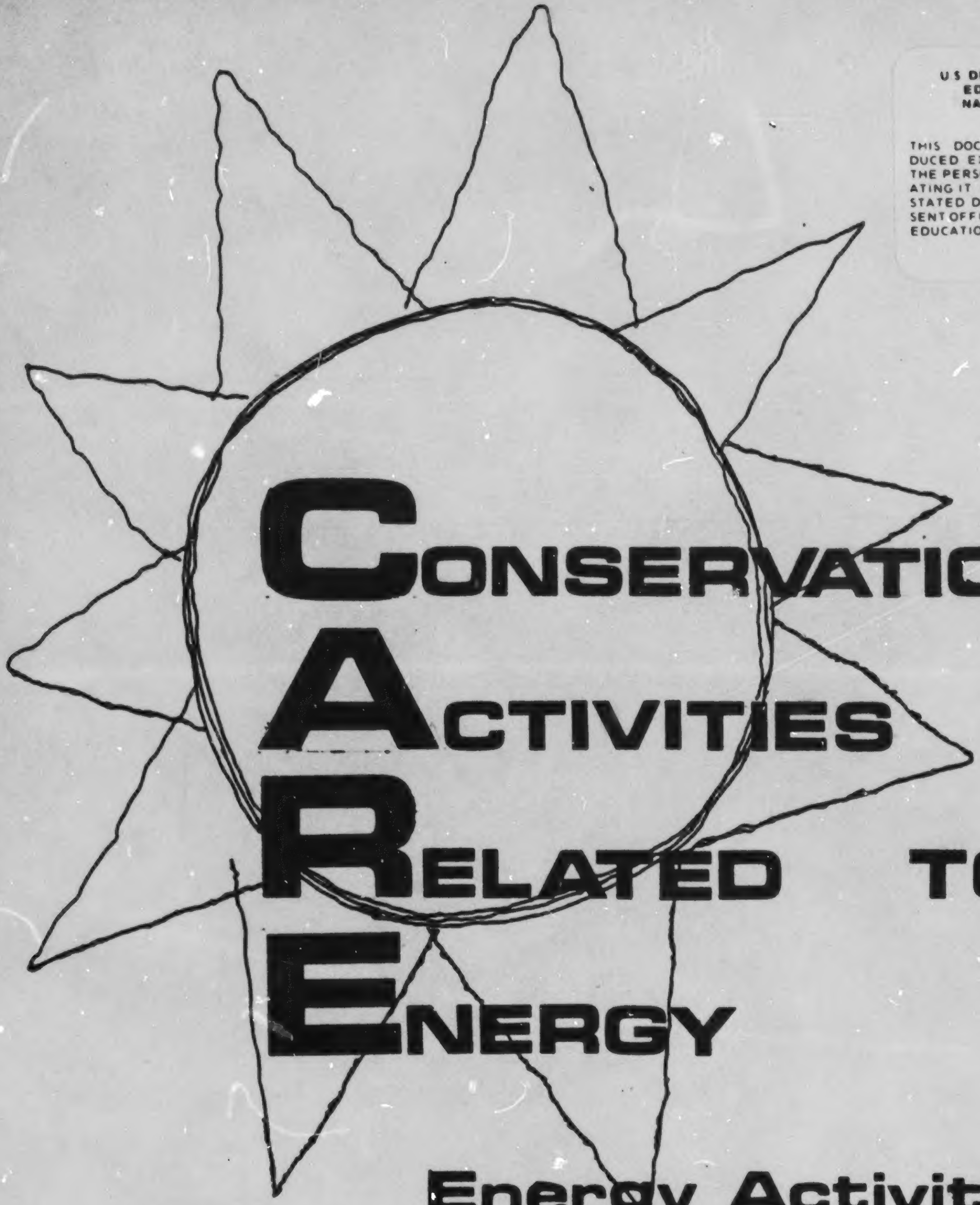

CONSERVATION ACTIVITIES RELATED TO ENERGY

Energy Activities for Urban Elementary Students K-6

prepared for the
U.S. DEPARTMENT OF ENERGY

SE 032 874

Prepared for The U. S. Department of Energy
Office of Education, Business and Labor Affairs
Washington, D. C. 20585

In cooperation with Teacher Corps Program - 79,
The School District of Philadelphia and Beaver
College, Glenside, Pa.

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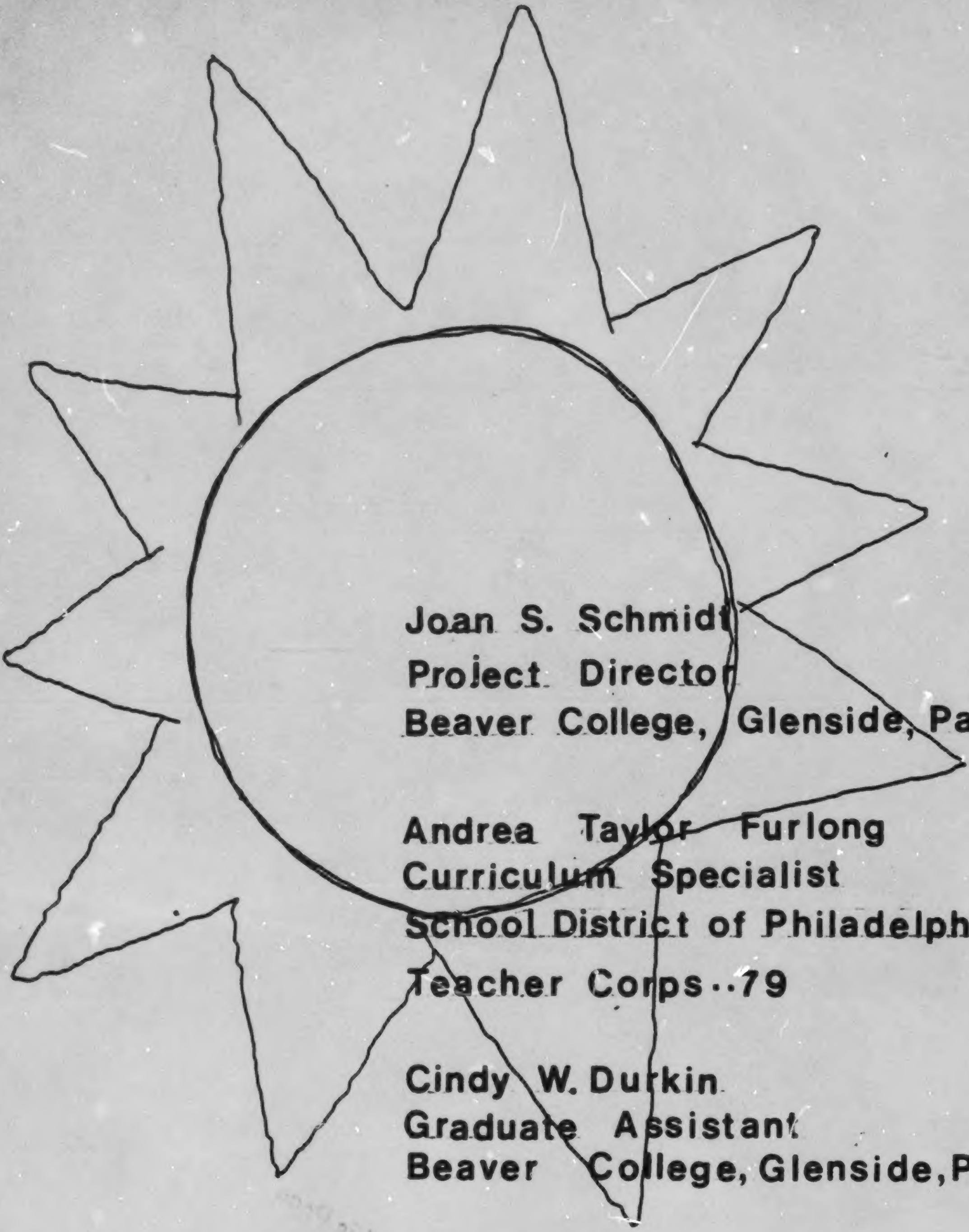

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Dear Colleague:

This book contains practical, simple activities, experiments and demonstrations related to energy conservation in the home, and was desinged for use in an urban setting. The project was funded under a grant from the United States Department of Energy which supports many efforts to educate the consumer and increase awareness of energy use. It is the philosophy of the Department of Energy that energy conservation must become a way of life and that an educated and enlightened consumer will use less energy and learn to save money in the process. As educators, we know that it is frequently easier to develop an attitude and outlook about something at an earlier age than it is to make significant changes at a later time. Consequently we have developed material for elementary school students with the idea that the information will help them become energy conscious and, therefore, a part of their everyday lives. We have included material and projects for the children to do with their parents and it is our hope that parents will consider implementing some of the suggestions in their homes.

The activities are divided into four areas: The Kitchen, The House, Gas and Go (transportation) and Heating and Cooling. All sections are arranged in sequential order and it suggested that in general, the order be followed. It may not be necessary to do all of the activities but the overall sequence is important. Each section begins with some theoretical background relating to energy and then focuses on energy use and conservation techniques as they apply to that part of their lives. The activities incorporate math and language arts as well as science and social studies and have been written for primary and/or intermediate levels. It is also possible to adapt them further to meet the individual skill levels of your students.

The material has been developed to require a minimum of extra preparation. Most experiments can be done easily in the classroom and those that require extra materials or preparation may be done by the science teacher in your school. The activity sheets and games will need to be reproduced on a thermofax machine and then duplicated.

It is our suggestion that the children keep an energy diary or notebook with drawings, charts and notes from the various activities. In that was they will have a finished product at the end of the term or school year. You may also want to extend this project to include the total school. A school Energy Bulletin Board showing the work your class has done and displaying new information about energy conservation. Another is a School Energy Bulletin or an Energy Fair where energy related projects could be displayed.

We hope you enjoy using this book and find it useful.

Joan S. Schmidt
Andrea Taylor-Furlong
July, 1980

IS THERE AN ENERGY CRISIS?

The trememendous deluge of often conflicting information about ENERGY, has us all concerned and confused. What are the national and world supply levels of energy? What will be the cost of energy by the end of the decade, or by the end of this year? Can the recent increase in energy costs be explained by supply shortages, or are we being exploited by the energy industry? What can we do to relieve the drain that spiralling energy costs place on our families' income?

Unfortunately, answers to all but the last question are not readily available. Controversy persists among professionals and lay people alike as to the most appropriate national response to our energy problems. While this stew simmers, however, we (households) can move forward to reduce the burden that increasing energy prices place on our families' incomes. To this end conservation is the most effective first order action.

The following energy realities are offered as an initial step toward understanding (and effectively dealing with) energy issues.

- Reality One: The world is not running out of energy.

Energy Resources of the United States and the world are enormous; increased recovery costs, inflation, geographical scarcity, and environmental constraints, however, will unquestionably force the price of energy up, up and up--reflecting the increased cost of production. Therefore, in the future we can expect to use less energy in supplying many of the goods and services we now enjoy--and will continue to enjoy. More precisely: in addition to utilizing the least cost fuel for any job, tremendous advances will take place in substituting energy efficiency for energy consumption.

- Reality Two: The United States will continue to be dependent on Middle Eastern Oil for many years to come.

The entire world is critically dependent on oil produced in the politically unstable Middle East. This dependence clearly depicts the problems which emanate from geographical scarcity (or plentifullness in this case). Although efforts will be directed toward reducing our susceptibility to economic upheaval resulting from supply interruptions and crippling price increases, this transition will take time and we will continue to import significant amounts of oil from abroad, for a long time.

- Reality Three: Higher energy prices cannot be avoided, but these negative impacts can be lessened through more efficient utilization of all fuel types.

Conservation and renewable energy sources (particularly solar and waste recycling here in Philadelphia) will allow us to continue to enjoy our present standard of living while consuming less non-renewable fuels. Energy prices can be expected to continue spiralling upward as they have throughout the 70's, but we can achieve a state of lower "purchased energy" consumption without sacrificing comfort,

- Reality Three (continued)

and also greatly reduce the drain on our incomes which we would otherwise experience without conservation.

- Reality Four: Environmental effects of energy use are serious and hard to manage.

The need to reduce the health threats posed by combustion of fuels in enormous quantities will cause energy prices to rise and may even limit the extent to which some particular fuels will be used. Federal, state and city officials are aware of the critical need to improve air quality here in Philadelphia. Furthermore, we need to develop a less expensive and more environmentally sound means of disposing our wastes to protect our rivers, streams, and oceans. Reducing the levels of pollutants we introduce into the environment is not cost-free. We will be forced to choose between a healthy environment and cheap energy.

- Reality Five: Conservation is an important energy resource.

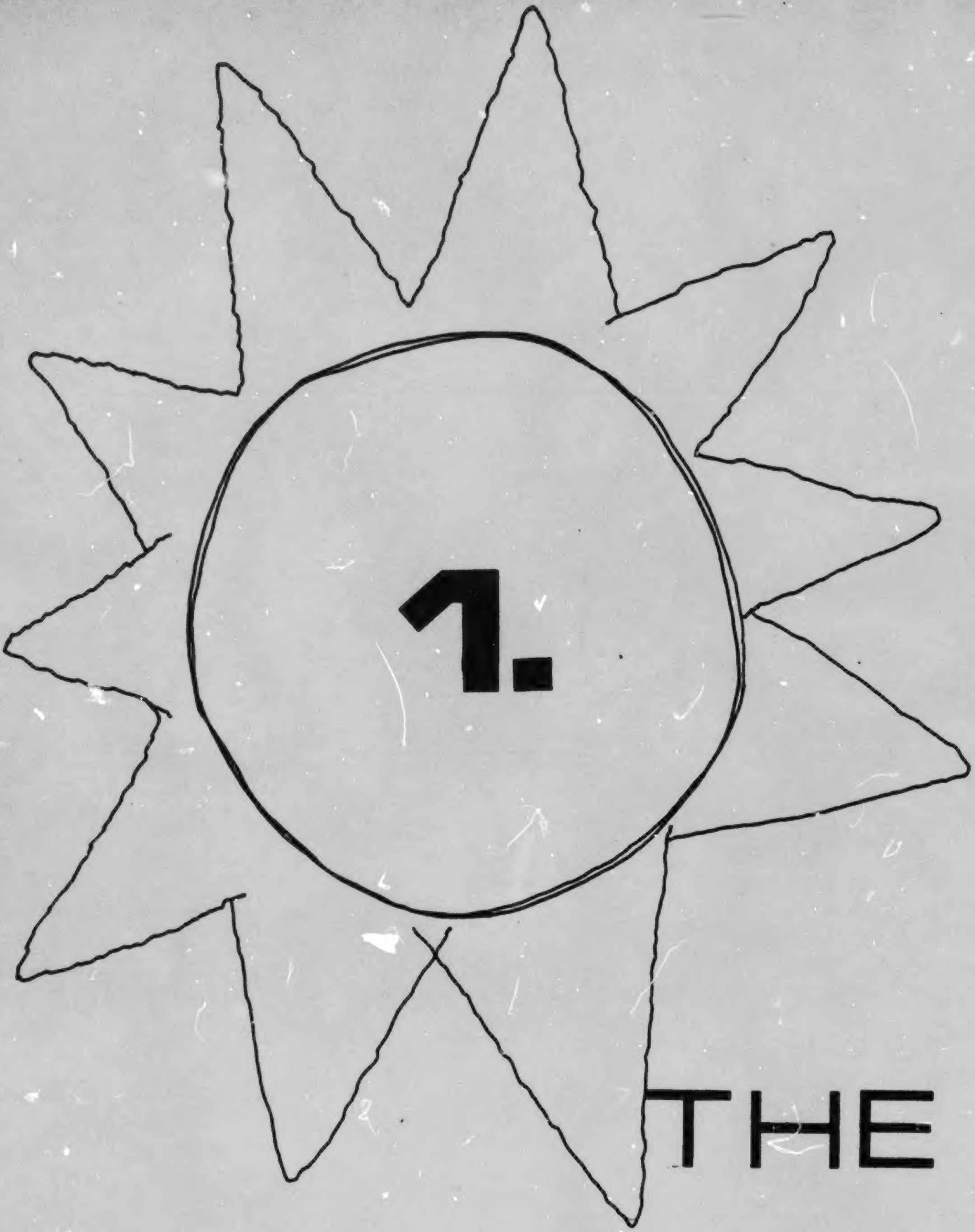
Both in the short run and the long run energy conservation will often be the quickest, cheapest, easiest, and least disruptive way to cope with rising energy costs. Moreover each gallon of fuel oil or cubic foot of natural gas saved makes our country less dependent on foreign energy supplies. Homeowners residing in Philadelphia's typical two and three story row-houses can reduce their energy consumption from 20 percent to 40 percent through basic insulation and weatherization. Many conservation measures require no adjustment in the present level of comfort. Increased combustion efficiency alone can reduce fuel oil use by 15 percent, without touching the thermostat. Thus conservation can allow us to continue with our present life style, save money, and stretch our nation's energy supplies so as to minimize our reliance on foreign energy supplies.

- Reality Six: Serious shocks and supplies are certain to occur.

Because the energy industry contains many fuel types, suppliers, delivery mechanisms, and pricing schemes there is no conceivable way of avoiding unforeseen shortages. We can prepare for such emergencies by understanding our energy needs and allocating energy during shortages in a prioritized basis.

Michael Ervolini - Energy Consultant

These energy realities are adapted from:
The Ford Foundation Energy: The Next Twenty Years Ballinger Publishing Co. 1979.



1.

THE KITCHEN

PRE-ASSESSMENT: ENERGY CONSERVATION IN THE KITCHEN

What Do You Know About Energy?

1. It is a hot summer day and Mom asks for suggestions for dinner. Would you:

   A. Pile in the car and drive to a drive-in restaurant?
   B. Tell Mom you want roast, potatoes, bread?
   C. Start the charcoal in the outdoor grill for hamburgers?
   D. Eat a cold salad?
   E. Other.

2. To save energy in the kitchen we can...

   ....Open the refrigerator door only when necessary.
   ....Put things in the refrigerator that are cool.
   ....Heat water in a kettle.
   ....Use the oven to bake several foods at once.
   ....Use a hand mixer instead of the electric mixer.
   ....Turn off the lights in the kitchen when leaving it.
   ....Use oven for toasting bread instead of using the toaster.
   ....Heat the kitchen by turning on the range.
   ....Eat cold food instead of hot.
   ....Cool the kitchen by leaving the refrigerator door open.
   ....Eat raw eggs.

3. Answer yes or no...

   ....Energy makes things hot.
   ....Eating a candy bar produces energy.
   ....Energy gives us light.
   ....Electricity is a kind of energy.
   ....There will always be enough electricity in the world.
   ....Electricity costs money.

Title:

What is Energy?

Level:

Primary

Description:

Students create motion and produce heat energy.

Concept:

Heat energy is produced through motion. Energy is used to heat, light and move things.

Activity:

Have the children run around the school yard or skip through the room until they begin to tire and feel warm. Have children feel the warmth from their bodies. Discuss with them how the body is constantly using energy to help us keep warm, move and grow.

Ask the children to look around the room and find something that moves or makes us warm. Have one child go to a convector of heat (radiator for example) and ask him/her to put a hand just above it. "Tell the class what you feel. What do you think is making the air move and feel warm?" Explain that we have heat in our bodies, that the radiator has heat and ask the children to think of other things in the room that give off heat. (lights)

Lead a discussion about the nature of energy. Explain that there are many things in the world we know are there because we see them but energy is one we cannot see. Ask the children how they might know that energy is there. (the light fixture has heat and light, the radiator feels hot, the children can run and jump.)

Ask the children to close their eyes and imagine what energy would look like if they could see it. Ask for their responses. Then ask them to close their eyes again and imagine what energy feels like. Accept all answers but conclude the lesson with the idea that energy produces heat and motion.

Materials: none

Source: The Energy We Use
National Science Teachers Association
U. S. Department of Energy, 1977

Title:

Energy Conversion - Muscular Energy

Level:

Primary

Description:

Students demonstrate how energy can be changed into other forms.

Concept:

Energy is neither created nor destroyed. It is converted from one form to another.

Activity:

Ask a child to clap his/her hands and ask the class to explain what kind of energy they think is causing the clapping sound. Teacher demonstrates striking a match and asks class what is causing the match to burn. "When you clap your hands, you change muscular energy to motion and sound." "When you light a match, you change the energy in the match to heat and light."

Ask students for other examples in which their energy makes something else move such as: riding a bicycle, skateboard, and using roller skates.

Distribute magazines and ask children to cut out pictures of people using muscular energy to make things move. Make a bulletin board display or have children begin their individual energy booklets. The booklet can be used for vocabulary development activities such as identifying color words, nouns, and verbs, and developing phonic skills.

Materials:

Magazines, scissors, paste, construction paper (optional), matches

Adapted from: Fowler, John (ed) Energy, Engines, and the Industrial Revolution Grade 8-9, National Science Teacher Association and the U. S. Dept. of Energy

Title:

Energy Conversion - Steam Energy

Level:

Intermediate

Description:

Students observe how energy can be changed into other forms.

Concept:

Energy is neither created nor destroyed. It is converted from one form to another.

Activity:

You may use the examples of muscular energy conversion listed on page 3 as an introduction to this activity. Half fill a flask with water and attach a balloon to the mouth of the flask. Place the flask on a heat source and observe the balloon expand with steam. Discuss the changes which have occurred. What caused the balloon to expand? (steam) Where did the steam come from? (water) What caused the steam to form? (heat). Discuss how energy is converted into different forms to produce heat, light and motion for our use.

Materials:

flask
balloon
stand
alcohol burner
matches

Source: Our World of Energy
Energy Education Advisory Council
Philadelphia Electric Company, Philadelphia, PA 1979

Title:

Energy Conversion - Popcorn Energy

Level:

Primary and Intermediate

Description:

Observation of corn popping provides a stimulus for a discussion of energy conversion.

Concept:

Energy allows physical changes to occur as it converts from one form to another.

Activity:

Discuss energy as you pop popcorn--How it is present in the kernel and how it is released? There is water in each kernel of corn which, when heated, converts to steam. The kernel expands and pushes against the tough skin of the kernel. Soon the kernel explodes and you can see the white starch of the inside kernel. Then you and your students can eat the experiment (food energy). Melt butter. Note the conversion of butter from solid to liquid form when subjected to heat energy. Note also that the electricity in the corn popper or hot plate is energy which has been converted from other substances, coal, oil, natural gas. This in turn converts to heat, which changes the moisture in the kernel to steam causing expansion and thus popping the kernel.

Materials:

corn popper
popping corn or
hot plate and covered pot
oil

Source: Arizona Department of Education, Phoenix, Arizona, 1974

Title:

Energy Conversion - Making Windmills

Level:

Primary

Description:

Students will observe how energy can be changed from one form to another.

Concept:

Energy is neither created nor destroyed. It is converted from one form to another.

Activity:

A brief introduction by recalling the events on page 3 is suggested. Distribute materials and direct the children to follow the steps shown on page 8. After children have made the windmills, ask them to demonstrate their projects to the class. Discuss the changes which occur when they blow on the windmills. Then ask the children what kind of energy cars and buses use to move. Where does this energy come from? A discussion of oil sources can follow. Ask children if they know what kind of energy makes the lights go on and where does this source come from?

Materials:

Oak tag square 3"x 3"
metal fastener
straw or stick

Source: Our Energy World. Energy Education Advisory Council,
Philadelphia Electric Company, Philadelphia, PA. 1979

Title:

Energy Conversion - Operating a Turbine

Level:

Intermediate

Description:

Students will demonstrate energy conversion under observable conditions by making and operating a steam turbine.

Concept:

Energy is neither created nor destroyed. It is converted from one form to another.

Activity:

Have each child make a windmill as described on page 8. Put 1 inch of water in a test tube, assemble the outside of the medicine dropper and insert it carefully through the one-hole stopper. Insert the stopper into the open end of the test tube, but don't push it in too tightly. Light the bunsen burner and heat the water in the test tube. Answer these questions:

1. What changes do you see?
2. Is energy involved in these changes? How?

Make sure that the windmill turns freely and direct the path of the steam against the paper blades of the windmill.

1. What is happening to the blades?
2. Can you explain why this is happening?
3. Is work being done? How?

Discuss how energy is converted to other forms.

You have demonstrated how stored energy (chemical energy) in natural gas can be converted into heat and how this heat can be converted into mechanical energy. Energy from water, coal, oil and radioactive substances is converted into electricity by using turbines.

Materials:

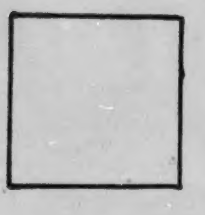
3" x 3" paper, metal fastener, straw or stick, bunsen burner, test tube, eye dropper, one-hole stopper, test tube stand, tongs or clamp.

Adapted from: Fowler, John (ed) Energy, Engines and the Industrial Revolution
Grade 8-9 National Science Teacher's Association and the U. S.
Department of Energy

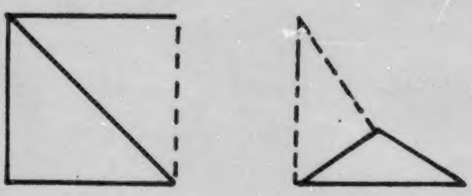
DIRECTIONS FOR MAKING A WINDMILL:

Construct a windmill out of cardboard or oak tag.

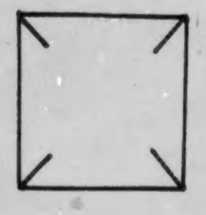
1. Cut a square of paper



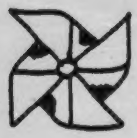
2. Fold like this---and this



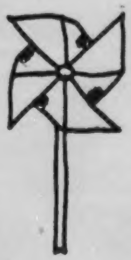
3. Open and cut on folds in toward the center



4. Fold in every other corner and fasten with paper fastener



5. Attach to a stick



Title:

Heat and Light

Level:

Primary

Description:

The children will decide which items give off heat and which give off light.

Concept:

Energy is converted to heat and light.

Activity:

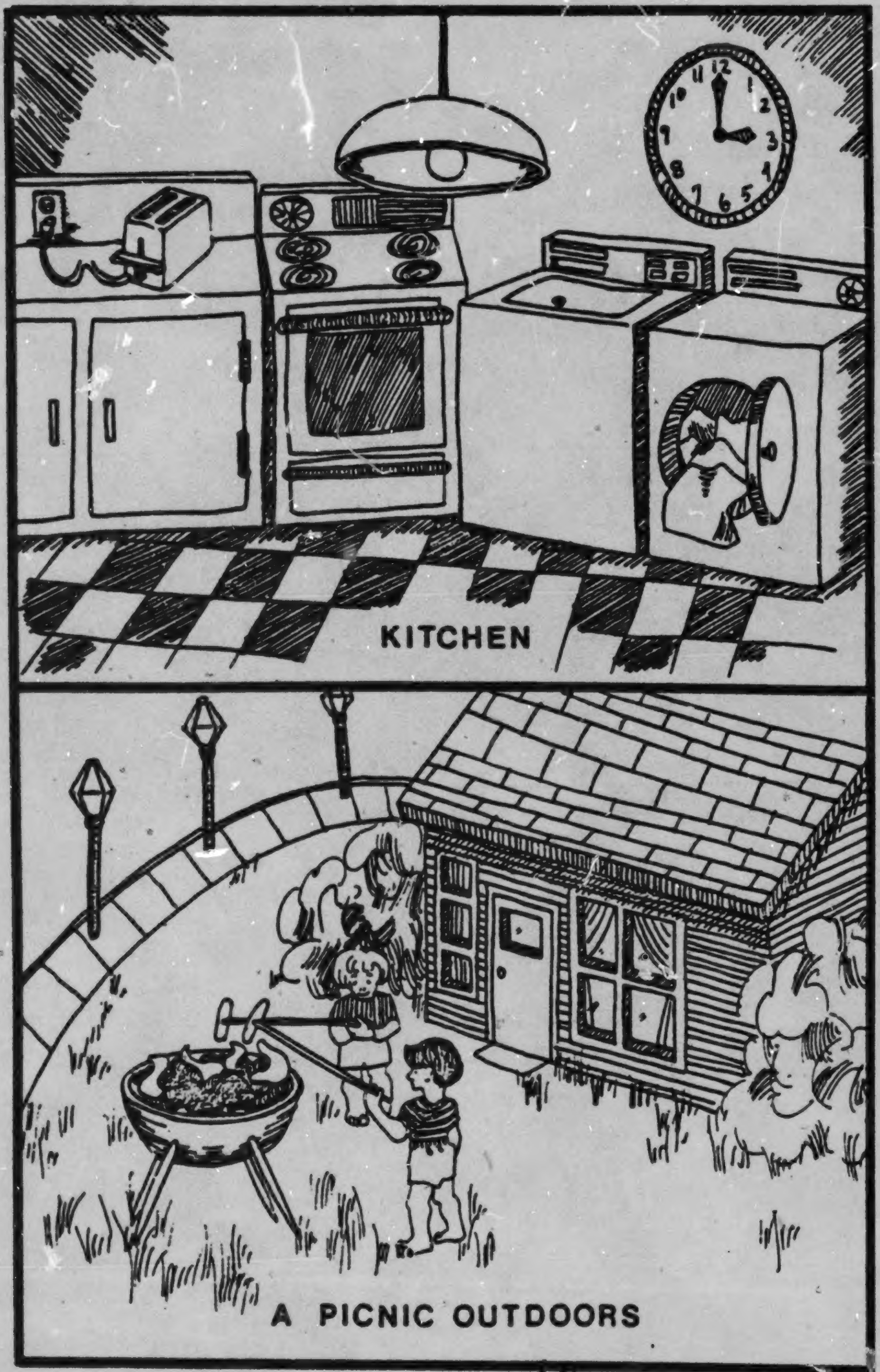
Using the activity sheet on the following page, the children will look at each picture and decide which things give off heat and which give off light. They will color each item.

Materials:

Heat and Light Activity Sheet
Crayons

Source: The Energy We Use, Grade 1, National Science Teacher's Association
U. S. Department of Energy, 1977

Which give off heat or light?
Color them orange.


KITCHEN
A PICNIC OUTDOORS

Source: Energy Activities, U. S. Department of Energy, 1977

Title:

Electrical Energy - Converting Chemical Energy to Light

Level:

Intermediate

Description:

Students will observe how chemical energy is converted into light or sound.

Concept:

Energy is neither created nor destroyed. It is converted into other forms.

Activity:

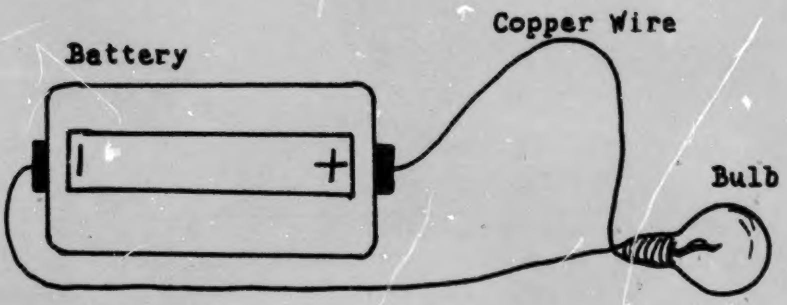
Divide the class into groups. Distribute lengths of wire, a bulb, a dry cell battery to each group. Have students connect these materials in such a way as to light the bulb. (see diagram - Page 12) This experiment should demonstrate electrical energy changing into light energy. The electrical energy is stored in the dry cell's chemicals. Light energy is represented by lighting of the flashlight bulb. You may wish to challenge the students by offering a special ribbon to the groups with the speediest time in lighting and the longest times in keeping their bulbs lit. After the activity is completed, ask children what energy was converted into light. How do homes and school get lights? The electric company converts the energy from one source usually coal, oil, or nuclear power into current electricity for the consumers.

Materials:

battery
flashlight
bulbs
insulated wire
tape

Source: Networks: How Energy Links People, Goods and Services
National Science Teacher's Association, Department of Energy. June 1979

WIRING DIAGRAM


Battery
Copper Wire
Bulb
|
+

Title:

Who Needs Energy?

Level:

Intermediate

Description:

This is a problem solving activity. What would you do for a period of several days with no energy?

Concept:

Clarification of our dependence on energy.

Activity:

1. Tell the children the following story:

   It is winter and heavy snow has blocked all the roads. Electric power and telephone lines have been knocked down. You are not within walking distance to a store and the water supply is a well which has an electric water pump. The storm is so severe you are marooned for several days.

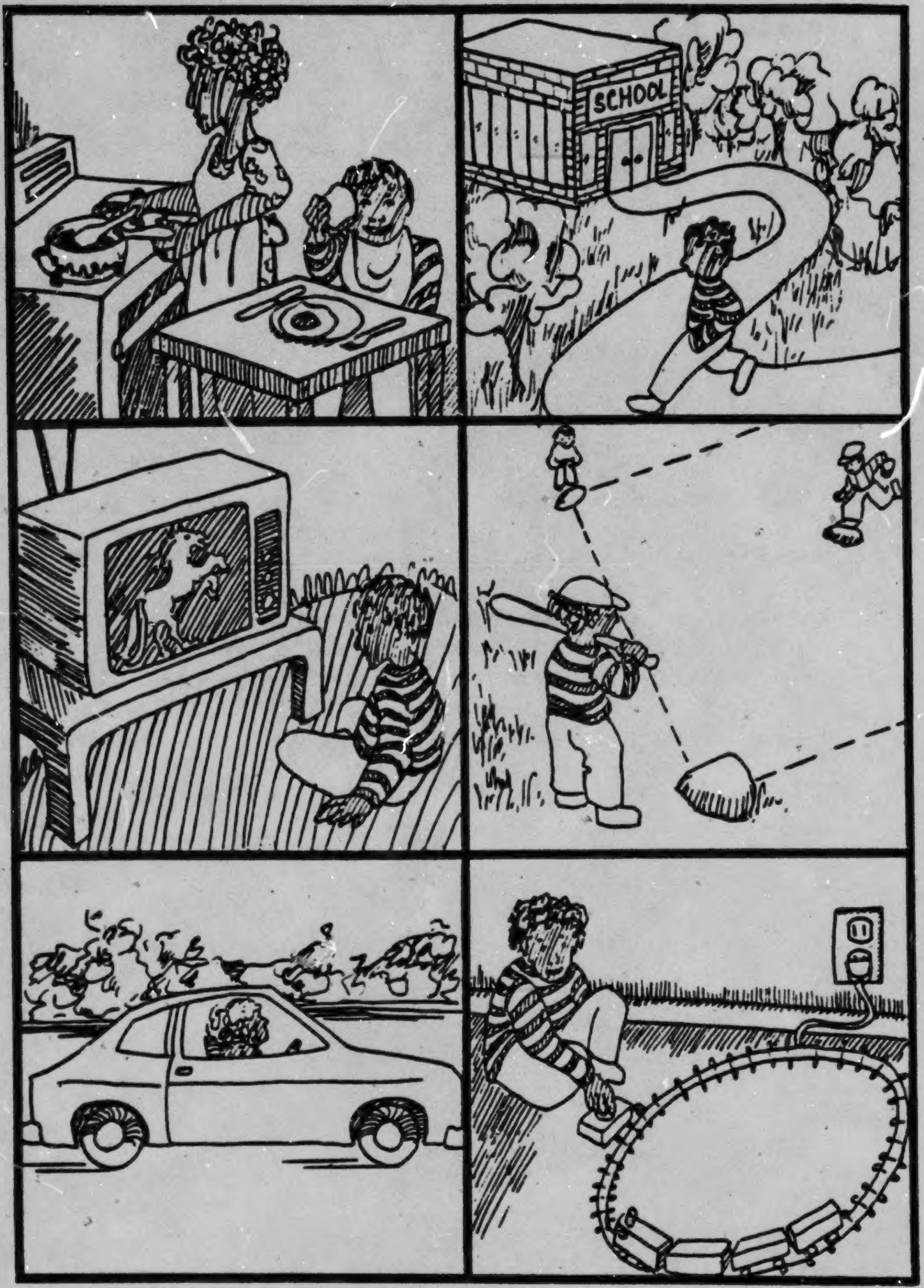
2. Divide the students into groups and ask them to plan their meals for two days. How will they keep warm? (Remind them that oil and gas furnaces require electricity to operate). What will they do for entertainment?
3. As each group describes its emergency plans and encourage the other groups to ask question. (Where will they get water to wash in? How will they cook food? etc.)
   This can be done as a large group activity.
4. Distribute follow-up sheet on the next page.
5. Help children realize that we have become dependent upon energy for our daily activities.

Materials:

paper
pencil
Follow-up-Sheet - "No Oil, No Gas---"

Source: Our World of Energy, Philadelphia Electric Company, Energy Education Advisory Council, Philadelphia, PA. 1979

No gas. No oil. No electricity.
Cross out the things Johnny can't do.



Source: Energy Activities, U. S. Department of Energy, 1977

Title:

Energy in the Kitchen

Level:

Primary and Intermediate

Description:

The children will list or name all of the things in the kitchen that require energy. Different activities will follow.

Concept:

We have become increasingly dependent on the appliances in our kitchens.

Activity:

1. Have the children list or name all of the things in the kitchen that use energy. Record the list on the board or experience paper.
2. Have the children cut out magazine pictures of all the items on their list. The pictures can be glued to oak tag.
3. Ask the children to classify the pictures.

Primary Grades - same initial consonant sounds,
same vowel sounds,
same final consonant,
---and other appropriate categories

Intermediate Grades - blends, digraphs, compound words

For All Levels - classify according to production of heat, light, and motion

Materials:

old magazines
scissors
glue
oak tag
experience paper or
chalkboard

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Appliance Rummy

Level:

Primary

Description:

Students play card game which helps them learn to name the initial sound of appliances.

Concept:

Students learn the names of appliances.

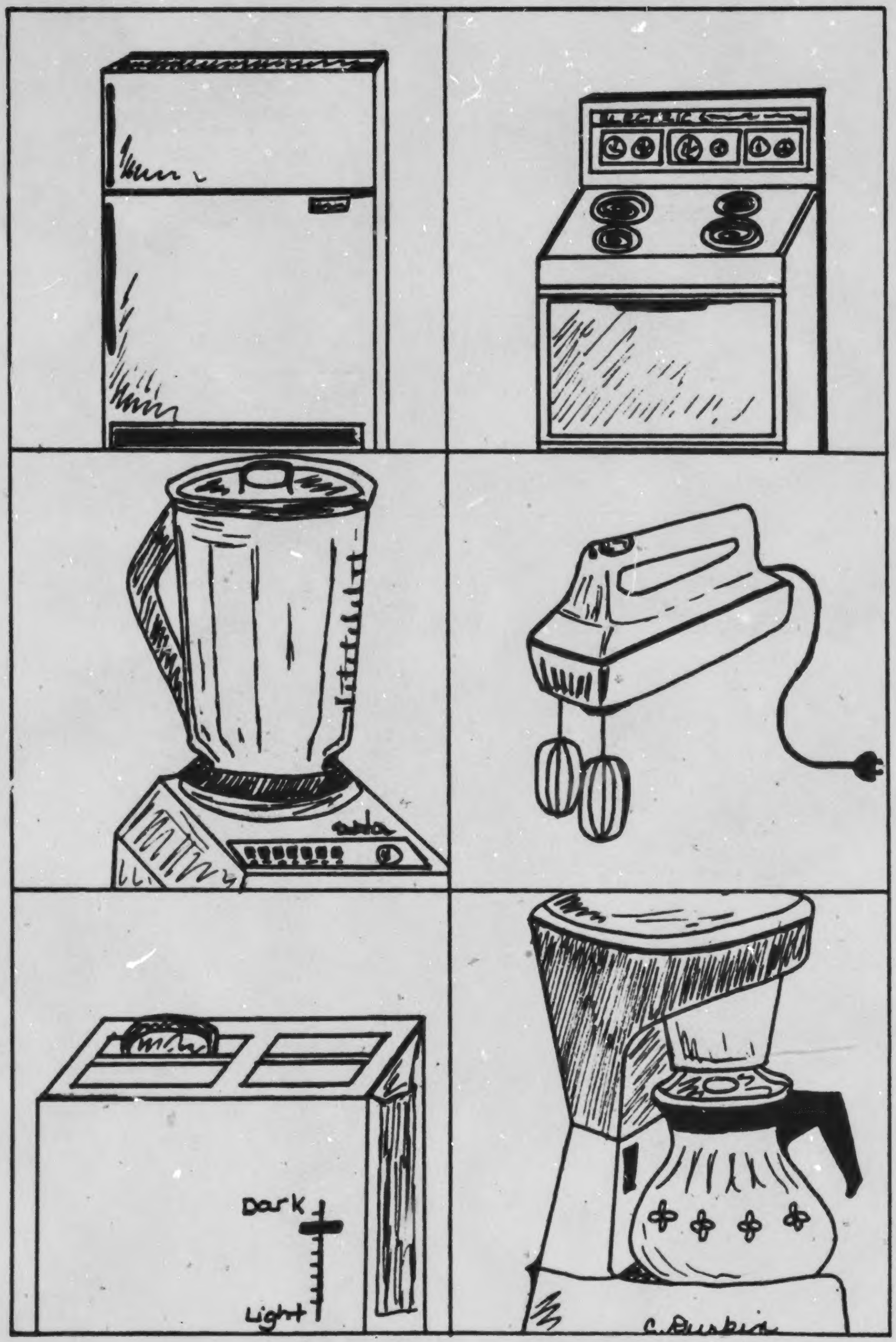
Activity:

Cut out the pictures of appliances in the next two pages. Paste the pictures on oak tag or cardboard. Divide class into groups of 2-4 students who take turns selecting a card from a pile in the center. If child identifies the name of appliance and/or provides other information correctly i.e. initial consonant, vowel sound, identifies object with same initial sound, the student keeps the card. If student is unable to answer correctly, the card is returned to the pile. The game ends when the pile is gone. The student with the most cards wins. Additional pictures may be added to the cards by cutting them from mail order catalogues. Crossword puzzle and seek and find may be used as extensions of this activity.

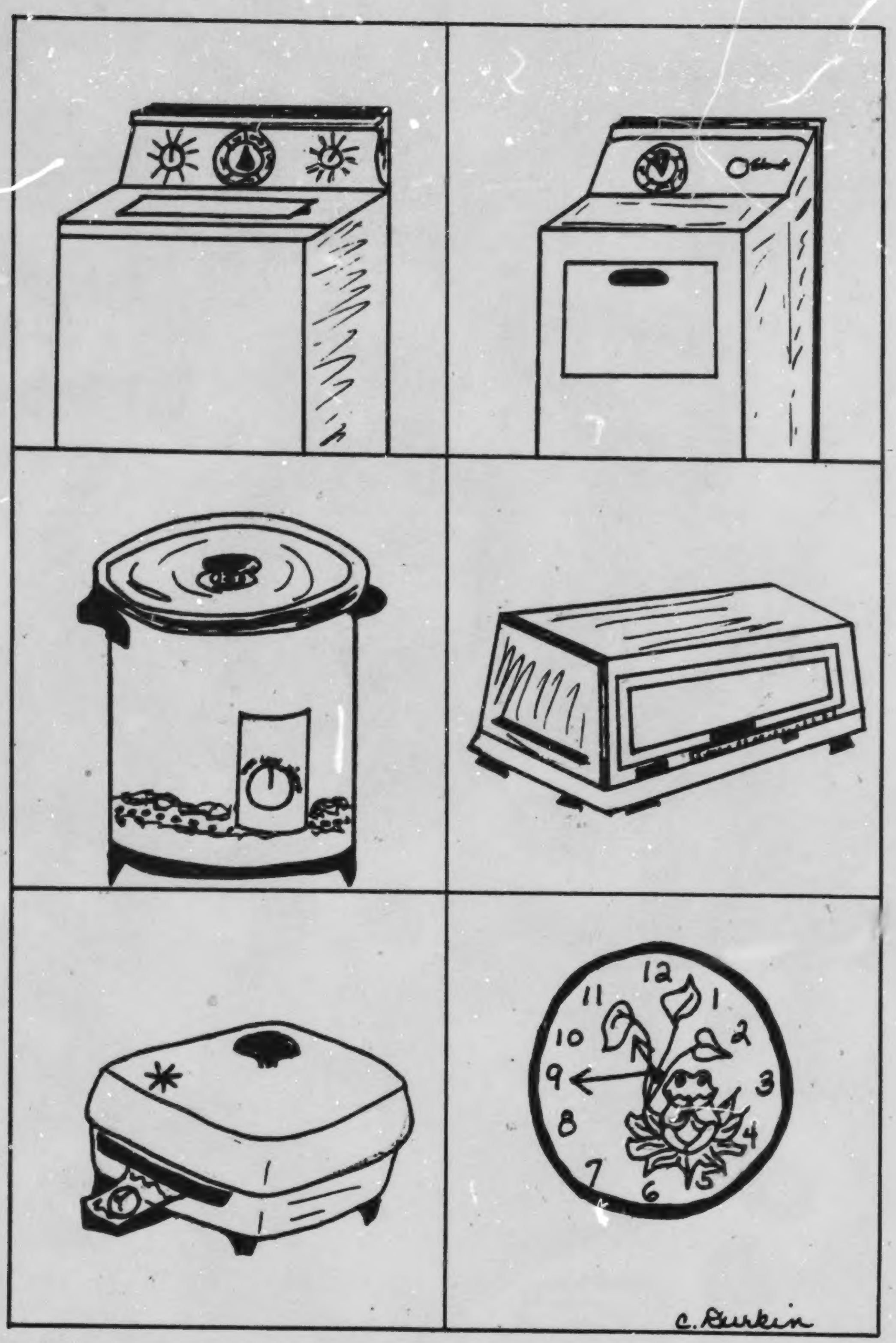
Materials:

rummy pictures
oak tag
scissors
glue

Source: Furlong and Schmidt, C.A.R.E, 1980

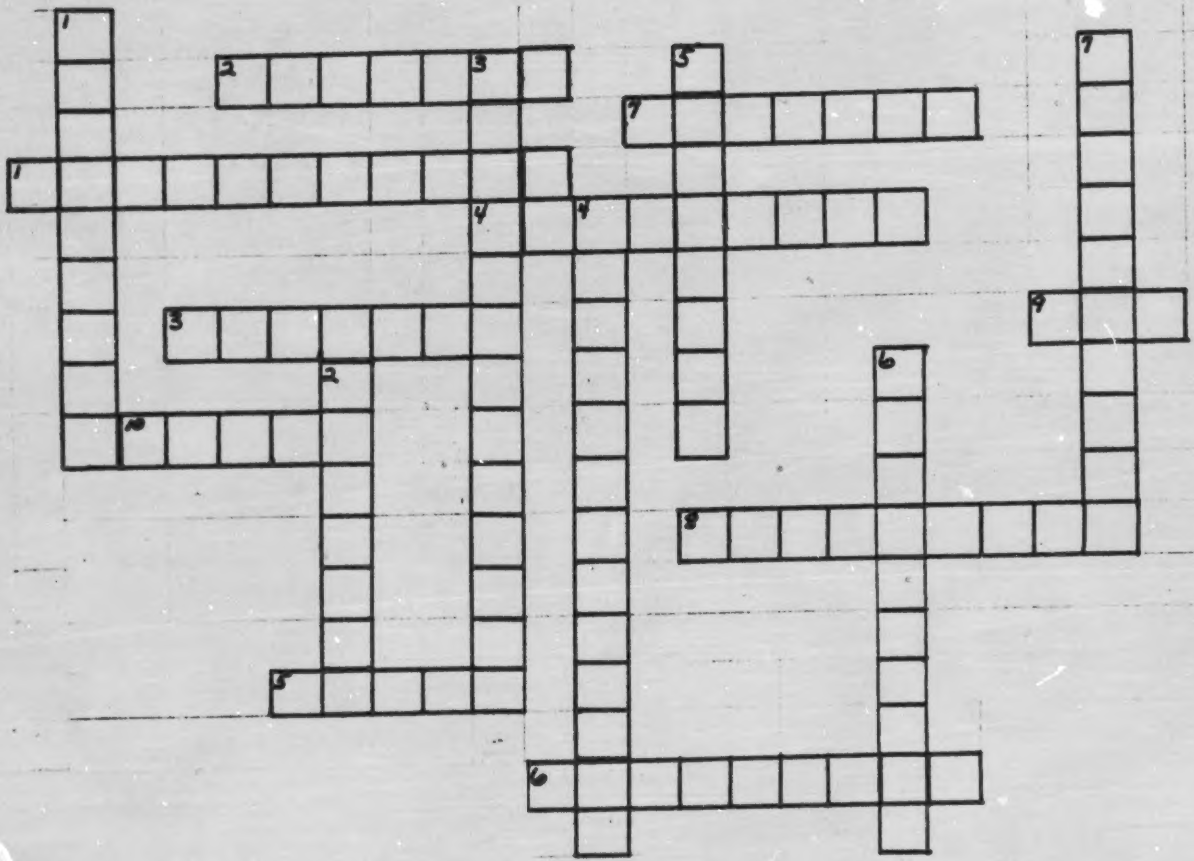

Dark
Light
C. Ruskin

Source: Furlong and Schmidt, C. A. R. E., 1980



Source: Furlong and Schmidt, C.A.R.E., 1980

APPLIANCE
PUZZLE


1
2
3
5
7
7
1
4
4
3
9
2
6
10
8
5
6

Source: Furlong and Schmidt, C.A.R.E., 1980

CROSSWORD PUZZLE

DOWN

1. When I want to eat a can of chicken noodle soup, I have to use a ________________ first.
2. My mother makes scrambled eggs in a ________________.
3. On Thanksgiving, my father uses our ________________ to cut the turkey.
4. When you bring milk home from the store, put it in the ________________.
5. Sometimes we have to use our ________________ because our stove is broken.
6. When I want waffles for breakfast, my mother has to find the ________________.
7. After dinner, we put the dirty dishes in the ________________.

ACROSS

1. To melt cheese on my toast I put it in the ________________.
2. Always put ice cream in the ________________.
3. To make a milkshake I use our ________________.
4. I like to eat pop-corn during a scary movie so Mom makes it in the ________________.
5. To bake a cake you have to put it in the ________________.
6. When my mother gets up in the morning, the first thing she plugs in is the ________________.
7. When I want toast with my scrambled eggs, I put the bread in the ________________.
8. It's fun to watch my mother make donuts in our ________________.
9. If something is burning in the kitchen, we turn on the ________________.
10. Our ________________ tells us what time it is.

SEEK AND FIND

O	C	O	F	F	E	E	P	O	T	S	R
L	U	C	O	F	F	E	D	W	U	O	L
S	R	O	A	S	T	E	I	A	K	E	R
S	O	C	O	R	K	B	S	F	S	P	T
T	T	O	S	H	N	L	H	F	F	C	H
O	A	R	F	H	I	E	W	L	H	A	R
V	R	N	S	F	F	N	A	E	O	N	F
E	E	P	K	P	E	D	S	I	T	O	R
O	G	O	I	F	D	E	H	R	P	P	E
T	D	P	L	E	Q	R	F	O	L	E	E
O	I	P	L	E	L	T	R	N	A	N	Z
A	R	E	E	T	S	F	L	N	T	E	E
S	F	R	T	A	S	A	E	T	E	R	R
T	E	R	O	V	E	N	S	L	O	P	D
O	R	T	R	E	Y	R	F	P	E	E	D
S	U	T	C	L	O	C	K	R	O	L	D

How many of the following words can you find? Circle them.

DOWN

1. canopener
2. skillet
3. electric knife
4. refrigerator
5. hot plate
6. waffle iron
7. dishwasher

ACROSS

1. toaster oven
2. freezer
3. blender
4. cornpopper
5. stove
6. coffee pot
7. toaster
8. deep fryer
9. fan
10. clock

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy Conservation in the Kitchen - High Energy - Low Energy

Level:

Primary

Description:

Children will select foods which not only require no cooking but also are high in nutrition.

Concept:

Eating nutritious foods which require no heating saves energy and can also provide good nutrition.

Activity:

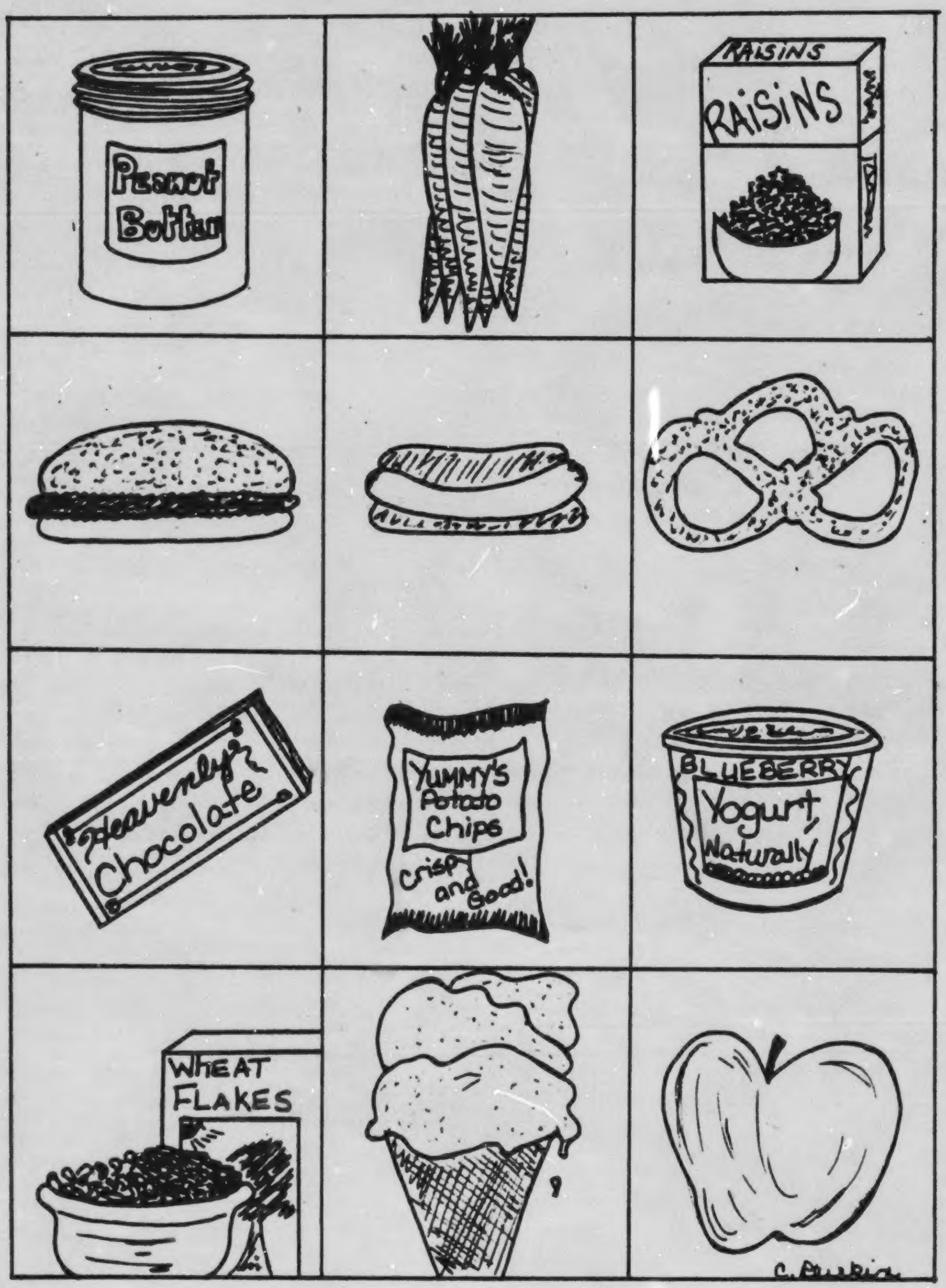
Ask children to circle the pictures of foods on the following sheet which are good for you but need no cooking to be prepared. Discuss their responses and distribute magazines with pictures. Ask the children to find the foods which are healthy but need no heating. Use pictures on a bulletin board display entitled "High Energy - Low Energy". Or have children paste pictures in their note book on two separate pages entitled "High Energy - Low Energy". Children can classify pictures according to raw, uncooked, needs refrigeration, needs no refrigeration.

Materials:

reproduction of the worksheet
scissors
paste
magazines

Source: Furlong and Schmidt, C.A.R.E., 1980

HIGH ENERGY — LOW ENERGY


Peanut Butter
RAISINS
RAISINS
Heavenly's Chocolate
YUMMY'S Potato Chips
Crisp and Good!
BLUEBERRY
Yogurt
Naturally
WHEAT FLAKES

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy Conservation in the Kitchen

Level:

Intermediate

Description:

Students will hypothesize in which container water will boil faster and stay hot longer.

Concept:

Conserving energy in the kitchen can occur in many easy ways.

Activity:

Heat a cup of water to boiling in a kettle and another cup in a pot on a double hot plate. Time, to determine in which the water heats to boiling first. When the water boils in the kettle, remove both from the heat and allow to cool for fifteen minutes. Measure the temperature in both containers before the water is heated, when the kettle boils, and after 30 minutes. Ask students to hypotehsize which container will boil first and will stay hot longer and why. Which method requires less energy to heat and why? Suggest other ways to save energy in the kitchen such as, baking several foods in the oven at the same time, eating some foods uncooked, and taking several energy saving items from the refrigerator at the same time. Distribute recipes to the children to take home to their parents.

Materials:

double hot plate
kettle
pot
water
liquid thermometer

Source: Adapted from: Science Activities in Energy: Conservation. Oak Ridge Associated Universities, Oak Ridge, Tennessee, 1979

P

NUTRITIOUS, ENERGY-SAVING RECIPES from
The Philadelphia Electric Company

Oven Meals:

MEAT LOAF RICE CAKE

1 batch of your favorite meat loaf recipe
1 large can tomato sauce
2 cups leftover rice
3-5 slices sharp cheese

Follow your usual meat loaf recipe. Form the meat into loaf. Slice loaf in half lengthwise. Remove top portion and fill with leftover rice, replace top portion. Pour tomato sauce over meat loaf and bake at 400 degrees for 40 minutes. Remove meat loaf from oven. Garnish with cheese slices while still hot. Serve with crisp salad.

SWEET POTATO PIE

1 package pie crust mix
1-1/2 cups mashed sweet potatoes
1 tablespoon melted butter
2/3 cup brown sugar
2 eggs, slightly beaten
1 cup milk
1 teaspoon cinnamon
1/2 teaspoon ginger
1/3 teaspoon allspice
1/8 teaspoon salt

Line an 8- or 9-inch pie plate with pie crust. Combine all ingredients. Beat mixture with rotary beater about 2 minutes. Turn mixture into the pie crust. Bake for 45 minutes, setting the oven at 450 degrees for the first 15 minutes--reduce heat to 350 degrees for the remaining half hour. Bake until a knife inserted in the middle comes out clean and the crust is nicely browned. Serve with roast chicken. (serves 6)

Nutritious Recipes (continued)

SOUTHERN-STYLE CORN BREAD

1 cup yellow corn meal
1 cup sifted all-purpose flour
1/4 cup sugar (optional)
4 teaspoons baking powder
1/2 teaspoon salt
1 egg
1 cup milk
1/4 cup shortening (butter, if preferred)

Sift together corn meal, flour, sugar, baking powder and salt into mixing bowl. Add egg, milk and shortening. Beat with rotary beater until smooth (about 1 minute). Bake in 8-inch baking pan (square or round) at 425 degrees for 20 to 25 minutes.

Electric Skillet Meals:

SOUL FRIED CHICKEN

3-5 pounds chicken (cut-up fryer)
1 cup flour (whole wheat is especially good)
1-1/2 cups vegetable shortening
1/2 teaspoon salt
1/2 teaspoon pepper
Dash garlic powder

Heat shortening in electric skillet or deep fryer. Sprinkle salt, pepper and garlic powder in flour. Then flour chicken and place no more than 3-4 pieces in skillet to insure even browning. Fry approximately 30 minutes. (serves 4-6)

Short Cooking Time:

SPICY SPARERIB BARBECUE SAUCE

1 tablespoon butter
1 large can tomato paste, plus 2 cans water
Juice of 1 lemon
1 teaspoon dry mustard
1/4 cup vinegar
1/2 teaspoon salt
1/2 teaspoon red pepper
Hot Sauce
Worchestershire sauce
1/2 cup chopped onion
1/2 cup chopped green pepper

Saute onions and green pepper in butter. Add tomato paste and juice from the lemon. Add all other ingredients using the hot sauce and worchestershire

Nutritious Recipes (continued)

SPICY SPARERIB BARBECUE SAUCE (continued)

sauce to your taste. Simmer for approximately 5 minutes to mix all flavors. Also delicious on steaks, chops, chicken, hamburger, and hot dogs. Double or triple the batch and keep a big jar handy in the refrigerator. (May be too hot for children.) Makes enough for 5 pounds of meat.

GRITS AND EGGS (Down-Home breakfast)

2/3 cup Quick Grits
2-2/3 cups boiling water
3/4 teaspoon salt
4 eggs
Breakfast meat if desired (bacon, sausage, ham)

Boil water in a heavy saucepan. Slowly stir in grits. When grits are boiling again, reduce heat. Cook 2-1/2 to 5 minutes, stirring often. Grits can be served with butter and eggs (cooked the way you like them), along with the meat of your choice or alone. Other interesting, energy-saving ways to serve grits are as a substitute for potatoes or cereal. For instance, grits and gravy or grits with milk and sugar for breakfast are really tasty. (serves 4)

Title:

Kitchen Appliance Audit

Level:

Primary and Intermediate

Description:

The children will survey their kitchens at home to determine the kinds of appliances they have. The survey sheet has information to be shared with parents on the monthly cost of operation per kilowatt hour.

Concept:

It costs money to operate the appliances in the kitchen. Wise use of these appliances can save money.

Activity:

1. Distribute the survey sheet to the children and explain that this is an activity they can do with their parents.
2. Children should check yes or no next to the name of each appliance on the list. If they have appliances at home that are not on the list they can add them.
3. Explain that electricity is measured in kilowatts and that electricity for a home is calculated in kilowatt hours. A kilowatt is 1000 watts; a kilowatt hour is 1000 watts used for one hour.
4. For primary children include idea that this is another way to measure, just as we would use a ruler.

Materials:

Kitchen Appliance Audit Sheet.

Source: Adapted from: The Energy We Use, Energy Education Advisory Council, Philadelphia Electric Company, Philadelphia, PA, 1979

APPLIANCE AUDIT FORM

Kitchen Appliance	We have it Yes	No	Monthly Kilowatt Hours	Monthly Cost
Blender			4	$ .24
Broiler			10	.66
Carving Kinfe			1	.06
Clocks (2)			3	.18
Coffee-maker (twice a day)			8	.48
Deep Fryer			15	.90
Dishwasher (once a day)			21	1.26
Skillet (5 times a day)			16	.96
Hot plate (5 times a day)			72	4.32
Toaster (once a day)			3	.18
Waffle iron (3 times a day)			2	.12
Range with oven			100	6.00
Refrigerator (single door, no defrost)			60	3.60
Mixer			1	.06
Slow cooker			4	.24

Source: Adapted from information from Philadelphia Electric Company, Philadelphia, PA. 1980

WORD SCRAMBLE

Unscramble the words in the left hand column. The words to match them are at the bottom of this page. When you figure out what word the letters spell, put it on the line next to the scrambled letter.

umucva ____________________

rnoi ____________________

anf ____________________

eresot ____________________

dairo ____________________

eathre ____________________

dairryehr ____________________

nieolvetsi ____________________

fan television vacuum

iron heater radio

stereo hairdryer

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Appliance Efficiency and Cost

Level:

Intermediate

Description:

This activity involves researching the initial purchase cost of kitchen appliances and the total cost of purchase plus operation.

Concept:

How necessary are all the kitchen appliances we use? Is there an alternative way of doing certain chores that would save money?

Activity:

1. Using the newspaper and magazines the children will cut out advertisements for appliances and the cost of purchase.
2. Using the ads and the appliance audit chart, have the children determine the total cost of an appliance, including operating it, for a year. For example, a blender that costs $30.00 new and .11 per month to operate has a total cost of $31.30. A $350.00 stove that costs $5.40 per month to operate has a total cost of $414.80.
3. Encourage the children to cut out pictures of as many different appliances as possible, including those that they may not have at home or have seen before.
4. Using the pictures and their cost calculations, the children can make a bulletin board display showing the kitchen appliances and total cost.
5. Generate a list of kitchen appliances that perform tasks that could be done in alternative ways. Discuss whether the alternative ways save energy or use more.

   For Example:
   electric knife vs. muscle power
   dishwasher vs. hand washing
   electric skillet vs. skillet on the stove
   toaster vs. toasting in the oven
   slow cooker vs. cooking on the stove
   corn popper vs. pot on the stove
   coffee maker vs. coffee pot
   electric mixer vs. hand beater
   microwave oven vs. conventional oven

Appliance Efficiency and Cost (continued)

The discussion could focus on the additional energy and money it takes to run a lot of small appliances, and the fact that as much fun as it may be to use "gadget appliances" they are not always necessary.

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Appliance Graph -1

Level:

Primary and Intermediate

Description:

Graphing activity using data from kitchen appliance survey.

Concept:

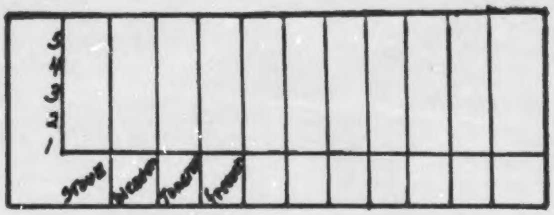
Most households contain appliances in their kitchens which, although providing many time saving conveniences, use energy and therefore cost money to operate.

Activity:

Using the data from the class "Kitchen Survey" make a bar graph which shows the total number of different appliances for the entire class.

Take a piece of experience paper and turn it horizontally. Leaving a 3" margin on the left side and on the bottom, draw a horizontal line across the bottom of the paper and darken the vertical line on the left side. Divide the columns into squares so there are enough vertically for every child in the class. Thus if there are 35 children in the class each column will have 35 squares. In the left hand margin number each square. Under the horizontal margin label each column with the appliance names.

As children read the results of their survey mark each square and color it in. The children can do this themselves on the class graph or individual graphs can be made on a ditto master and reproduced.



Materials:

- experience paper
- magic marker or crayons
- ruler
- pencil

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Appliance Graph-2

Level:

Intermediate

Description:

This is a graphing activity using the data from the kitchen appliance survey.

Concept:

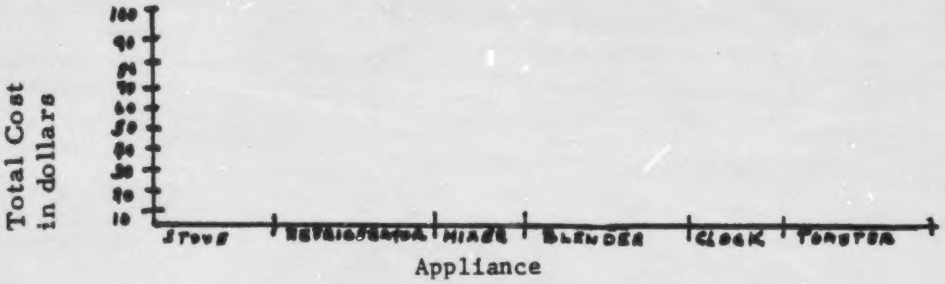
Determining the cost of the energy required to maintain kitchen appliances. Wise use of these appliances can save money.

Activity:

Using the data from the kitchen appliance survey graph, construct a second graph to show the total class cost of operating the appliances for a month.

1. Provide students with the chart that shows the monthly charge for operating each appliance. Have the students add the cost for each appliance. For example, if all 35 children have refrigerators the average monthly cost is $3.24 x 35 or $194.00. The children should calculate the cost in this way for each appliance they have listed on the first Appliance Graph.

2. Using their calculations set up the graph in the following way:



3. Follow the directions for using chart paper to make a graph from the preceding activity.

Materials:

Kitchen Appliance Survey Graph
graph paper

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy Conservation in the Kitchen

Level:

Intermediate

Description:

Children write and present humorous T. V. commercials stressing energy conservation.

Concept:

Conserving energy is economical.

Activity:

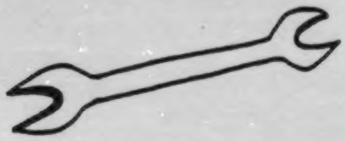
Divide class into groups to write and present T. V. commercials on wise energy use. Some of the topics might be to develop a commercial for an outrageously, impractical kitchen gadget. Another, on things you don't really need or gadgets you can do without. Emphasize, in a humorous way, that to save energy is to save money. Or the students can write commercials, in small groups or individually, illustrate them and display on a bulletin board or in a booklet. The written commercials may be recorded on tape and presented to other classes.

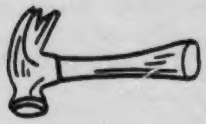
Materials:

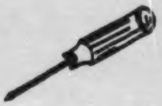
tape recorder (optional)

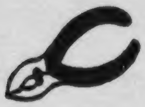
Source: Furlong and Schmidt, C.A.R.E., 1980

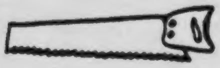
Do You Know the Name ?

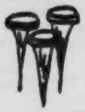


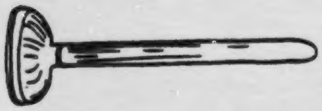


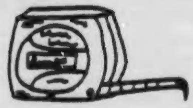


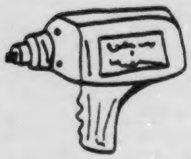












Pliers

Measuring Tape

Hammer

Drill

Wrench

Screwdriver

Saw

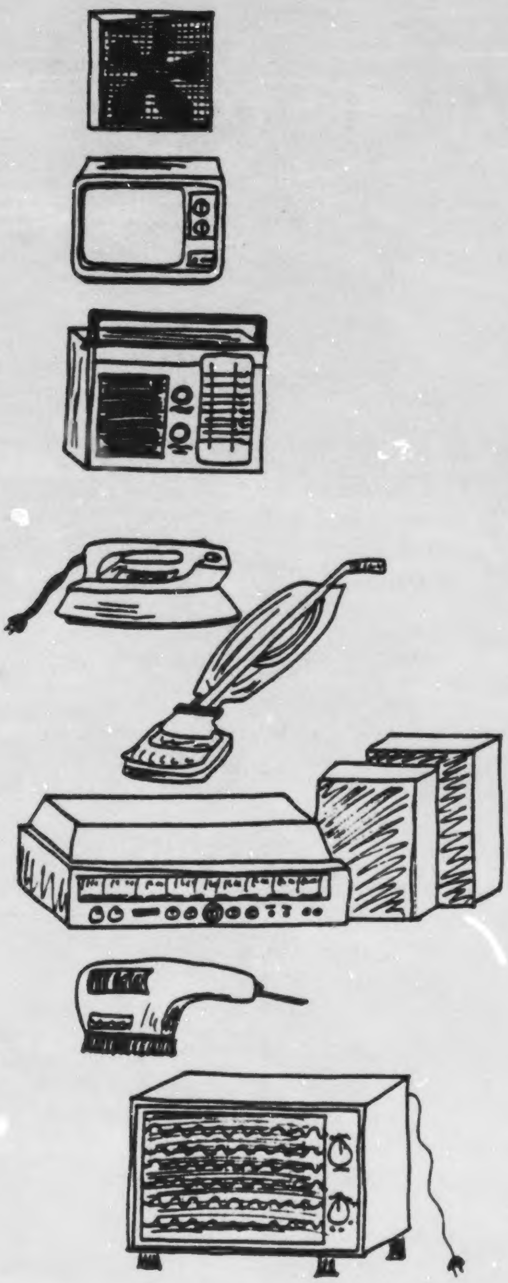
Nails

Plunger

Draw a line from the name of the tool to the picture.

Source: Furlong and Schmidt, C.A.R.E., 1980

Do You Know the Name?



Television

Vacuum

Hair dryer

Heater

Iron

Radio

Stereo

Fan

Draw a line from the name of the appliance to the picture.

Source: Furlong and Schmidt, C.A.R.E., 1980

Do YOU know that. . .

...To cook in a conventional oven for one hour at 350 degrees uses 4,120 kilocalories of energy but simmering only uses 520 kilocalories?

...A self-cleaning oven uses less energy to heat up because of better insulation?

...Baking in a micro-wave oven uses 40% less energy than a conventional one?

...Cooking on top of the stove uses 30% less than a conventional oven?

...If our country's population ate one pound of perch or sardines instead of one pound of beef or shrimp once a month for one year, we'd save 99-117 million barrels of oil?

...If the population eliminated one hour of baking at 350 degrees once a month for a year, we'd save 7.6 million barrels of oil?

...If we didn't use disposable aluminum trays once a month for a year, we could save 2.8 million barrels of oil?

...If the population substituted one pound of bread for one pound of beef per month for one year, we'd save 121 million barrels of oil?

2.

THE HOUSE

PRE-ASSESSMENT: ENERGY CONSERVATION AROUND THE HOUSE

What Do You Know About Energy?

1. Shower or Bath?

Mom wants you to wash up every day, but she warns you not to be wasteful! Would you:

A. Insist on hot showers all the time?
B. Learn to get clean in cool showers?
C. Learn to take showers instead of baths?
D. Take a quick bath each day?
E. Ask your parents to install a water-saving showerhead?
F. Other

2. If you wanted to save energy in your house would you...
...turn off the lights when you leave the room?
...bathe in cool water?
...fix a leaking faucet?
...turn up the hot water heater to the highest setting?
...leave the T.V. on when no one is watching?
...read your electric meter to find out how much electricity you are using?
...use your fan instead of an air conditioner?
...buy a color T.V.?
...use a broom instead of an electric cleaner?
...buy a dishwasher?

3. Yes or No...
...All energy is renewable (can be made again).
...Sun, water and wind are sources of energy.
...Gas, coal and oil are non-renewable resources.
...Muscle power and animal power are also sources of energy.
...Saving energy means saving money.
...Meters measure the gas, electricity and water we use in our homes.
...A color T.V. uses more energy than a black and white T.V.
...We can save money if we don't use a lot of small appliances.
...A leaking faucet can cost you money.
...It takes a lot of energy to heat water.

Title:

Early Sources of Energy

Level:

Primary

Description:

Students will act out activities which represent the use of muscular power and animal power.

Concept:

Muscular and animal power, along with wind, water and sun, have been the primary sources of energy used for thousands of years.

Activity:

Explain to children that before electricity was generated and oil discovered, people who lived and still live in primitive cultures used muscles, animals, sun, wind and water as power sources. This activity demonstrates what muscular and animal energy can accomplish. Divide children into two teams. Write descriptions of people and animal activities on slips of paper, place in a box and ask members of a team to select a slip. A team has 3 minutes, (use an egg timer) to guess the opposing team's pantomime. Use activities needed in building, farming, and sports for muscular power. Animal activities include plowing, pulling wagons, carrying burdens, and can be made more interesting when specific animals are described; i.e. elephant pulling logs, horse pulling sleigh, oxen pulling a plow. After the activity, you may want to select several of the actions depicted and discuss how machines have replaced these activities; oxen pulling plow vs. tractor; elephant pulling logs vs. bull dozer, horse pulling sleigh vs. snow mobile.

Which is more efficient and why? Emphasize that muscle and animal power are renewable resources.

Material:

slips of paper
box
pencil

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

What Am I?

Level:

Primary and Intermediate

Description:

Using riddles and brainstorming, the children will become familiar with the concept of renewable and non-renewable resources.

Concept:

The students will understand the difference between renewable and non-renewable energy resources.

Activity:

Using the following riddles to introduce the concept of renewable and non-renewable resources:

1. I give off heat.
2. It is dark at night without me.
3. I rise in the east, set in the west.
4. I sit in the sky.

What am I? (the sun)

1. I am a liquid.
2. I fill streams, ponds and rivers.
3. I make plants grow.
4. People use me for drinking, cooking and washing.
5. I am used to power equipment.

What am I? (water)

1. When I move fast it feels cold.
2. I can knock over trees when I blow hard.
3. I can dry clothes when I blow.
4. I can make the snow drift.
5. I can be converted into electricity.

What am I? (wind)

1. I come out of the ground.
2. Some stoves use me to get hot.
3. You can tell how much of me you use if you read your meter.
4. You can't taste me, or see me, you can smell me because a smell is added to let you know I'm around.

What am I? (natural gas)

What Am I? (continued)

1. People drill for me.
2. Without me cars could not go.
3. I make houses warm.
4. I am a thick liquid.

What am I? (oil)

1. People go underground in tunnels to dig me up.
2. I leave soot on everything when I burn.
3. I make houses warm.
4. I am black and come in chunks.

What am I? (coal)

After the children have guessed the answers, write them on the board. Then ask the children to brainstorm all the ways they think the sun, water, and wind are alike. Write their responses on the board or experience paper. Do the same with gas, coal, and oil. Discuss the results of the brainstorming and then explain that the sun, water and wind are called renewable resources because they are always around and can be replaced and reused. Gas, coal, and oil, on the other hand, are non-renewable because once they are used up they can never be replaced.

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Renewable and Non-renewable Energy: Fire

Level:

Intermediate

Description:

Set paper on fire using a magnifying glass (renewable) and a match (non-renewable).

Concept:

Some energy sources can be used repeatedly while others cannot be replaced once they are gone.

Activity:

Using a magnifying glass and a match set two pieces of paper on fire. This experiment has to be done on a sunny day. Put the paper under the magnifying glass and focus the sun's rays in the glass until the paper begins to burn. Then light the other piece of paper with the match. Explain that the solar energy and the magnifying glass can be used over and over. The match is struck once and is then useless. This is a non-renewable energy source.

Discuss with the class whether or not they think the following are renewable or non-renewable energy sources:

sun, coal, oil, wind energy system, tidal energy system,
natural gas, trees.

Materials:

magnifying glass
match
paper

Source: Solar Energy Curriculum, Department of Energy, 1979

Title:

What Makes Things Go?

Level:

Primary

Description:

Students will draw pictures or cut out pictures of people doing work, using machines, or pictures of appliances and machines.

Concept:

The sources of energy most frequently used are derived from fossil fuels which are a non-renewable resource. We must become aware of the sources of energy used in daily living in order to conserve energy more wisely.

Activity:

Review terms renewable and non-renewable. If you have not done so before, you may wish to underline the root word new, the prefixes re and non, and the suffix able. Ask children to draw or cut out pictures of people doing activities such as raking leaves, cutting grass, and shoveling snow; people working with machines such as a power mower, or appliances and pictures of machines which do work. Ask children to classify the pictures of machines which do work. Ask children to classify the pictures into renewable and non-renewable according to the energy sources used to make the activity depicted in the picture. You may also want children to classify the pictures into other categories such as indoor and outdoor activities, electrical, gasoline and gas sources, summer and winter activities, and work and pleasure activities. After the children have discussed the pictures, make a bulletin board display of the pictures with the title: "Renewable - Non-renewable Sources of Energy - Do you know?" Number the pictures and ask students to guess whether the pictures depict renewable or non-renewable resources. Or, divide the bulletin board in half, label one half of the board "Renewable" and the other half "Non-renewable". Place pictures on the appropriate half of the board.

Materials:

crayon
paper
scissors
magazines

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

There is More Than One Way to Make Things Go.

Level:

Primary or intermediate.

Description:

Students will examine pictures drawn or cut out for the previous lesson to determine whether the activities in the pictures could be accomplished by using energy from a renewable resource.

Concept:

The primary sources of energy are derived from non-renewable sources. In order to conserve the energy sources we must find ways of living which use renewable energy sources wherever possible.

Activity:

Examine the pictures on the bulletin board and ask children to identify the activities which could be accomplished by using renewable energy sources. Draw pictures of the alternative methods and put them next to the pictures using the conventional methods. Discuss options for using muscular energy instead of electrical or chemical energy, to cut grass, shovel snow, chop and mix foods.

Materials:

crayons
paper

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy: Then and Now

Level:

Intermediate

Description:

Children interview family and community members to determine what appliances were available in the years 1940-1945 and 1915-1920.

Concept:

The increased use of labor saving devices has increased the need for energy.

Activity:

Refer to previous lists which children have made of the appliances in their homes. Use this information in the NOW column and then ask children to interview people, in the family or neighbors, who remember life during the years of 1940-1945 or 1915-1920. Give children a copy of the checklist on page 47 on which to record their information. When children return to class with the information, make a class tally of the appliances used during 1940-1945 and 1915-1920. Make a comparative class graph showing the number of appliances used during three different periods of time. Then discuss how an increased use of appliances has effected the amount of energy consumption in the U. S. This activity can be integrated into a social studies unit about community life in the first half of the century or a unit about family "roots".

Materials:

activity sheets,"Why More Energy?"
pencils
checklist paper
felt tip markers

Source: Furlong and Schmidt, C.A.R.E., 1980

WHY MORE ENERGY?

NOW	1940-1945	1915-1920	
_____	_____	_____	TV set
_____	_____	_____	vacuum cleaner
_____	_____	_____	clothes dryer
_____	_____	_____	electric dishwasher
_____	_____	_____	electric toothbrush
_____	_____	_____	radio
_____	_____	_____	electric razor
_____	_____	_____	electric mixer
_____	_____	_____	phonograph
_____	_____	_____	air conditioner
_____	_____	_____	freezer
_____	_____	_____	refrigerator
_____	_____	_____	central heating
_____	_____	_____	automatic washer
_____	_____	_____	electric or gas stove
_____	_____	_____	blender
_____	_____	_____	power mower

Source: Energy Activities, Grade 3, National Science Teachers Association,
U. S. Department of Energy, 1979

Title:

Another Way of Doing Work

Level:

Primary and Intermediate

Description:

Students generate alternative methods of doing work which uses less energy. They examine the advantages and disadvantages of these alternative methods.

Concept:

Energy is possible if we use alternative methods for doing work.

Activity:

Divide the class into teams and ask the teams to list as many pairs of alternative ways of doing work commonly found in our way of life such as:

1. Diswasher vs. doing dishes in the sink.
2. Fan vs. air conditioner.
3. Power mower vs. hand mower.
4. Electric razor vs. hand razor.
5. Bath vs. shower.
6. Gas stove vs. electric stove.
7. Electric sweeper vs. broom.
8. Automobile vs. bicycle.

A large chart can be made of the alternatives. Then, a class discussion can follow in which the alternatives are discussed as to the amount of energy used and the benefits received. Encourage the students to think seriously about the advantages of both alternatives. Then ask the teams to select an alternative from each pair from the list and see if the class supports or does not support the choice.

Materials:

chart paper
felt tip markers

Source: A Teacher's Handbook on Energy, Colorado Department of Education, Denver, Colorado, 1978

Title:

Ways of Doing Work

Level:

Primary and Intermediate

Description:

Students will brainstorm alternative uses to using appliances.

Concept:

Energy, its production, use, and conservation are essential in the maintenance of our society as we know it.

Activity:

Ask students to brainstorm the names of appliances/machines which help us around the home. Make a list and then ask the students to think of as many alternative ways of doing the work. This part may be completed as an independent seatwork activity. Divide the list into "those your family needs" and "those extras they want". Ask the children to select 10 electrical items that they feel are necessary for their family. Make a coat hanger mobil with cut-out pictures of the electrical items which the children feel are necessities.

Materials:

paper
pencil
coat hangers
magazines
scissors
glue

Source: Energy Conservation Activities Packet, Grades 3 and 4, Iowa Energy Policy Council, Des Moines, Iowa, 1979

Title:

Read a Gas Meter Exercise

Level:

Intermediate

Description:

Students will determine the amount of natural gas used in their homes during a specific period of time.

Concept:

The flow of natural gas into the home is measured by a meter in units of cubic feet and each home owner is charged for the amount used.

Activity:

Begin with sheet A to familiarize the students with the appearance of a gas meter. This is an appropriate place to discuss units, ten hundreds, and thousands. Then show children how the amount of energy is used. At this point, a lesson in subtracting four place value numbers might be indicated. Show how the units are converted into cubic-feet of gas. Once again, time might be spent reviewing multiplication of units and tens by one hundred. Using a copy of the sheet on page 53, ask children to record a reading of their gas meters in the A.M. and P.M. of the following day or days. Bring sheets back to school and calculate the number of cubic-feet of gas used in the students' homes during a given period.

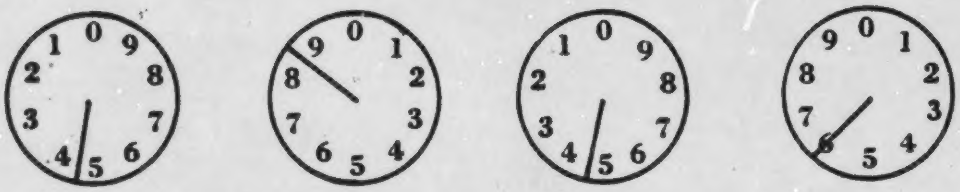
Materials:

a copy of sheets on page

Source: Energy Conservation Activities Packet Grade 4, Iowa Energy Policy Council, Des Moines, Iowa, 1979

Sheet A

READING A GAS METER


1 0 9 2 8 3 7 4 5 6
9 0 1 8 2 7 3 6 5 4
1 0 9 2 8 3 7 4 5 6
9 0 1 8 2 7 3 6 5 4

READING = 4846

Sunday meter reading is 4786

Next Sunday meter reading is 4846

How much has home consumed?

```
 4846
-4786
    60 'units' of gas
```

Each 'unit' = 100 cubic-feet of gas

60 × 100 = 6,000 cubic-feet of gas

Source: Energy Conservation Activities Packet, Iowa Energy Policy Council, Des Moines, Iowa, 1979

Title:

Read an Electric Meter Exercise

Level:

Intermediate

Description:

Students will determine the amount of electricity used in their homes during a specific period of time.

Concept:

The flow of electrical energy into the home is measured by a meter in units of kilowatt-hours and each home owner is charged for the amount used.

Activity:

Distribute copies of Read-A-Meter Exercise sheet on page 53. Go through the steps with the children using the sheet on Page 51. If necessary, review the concepts of four place value numbers, subtracting four place values numbers and multiplying ones by thousands.

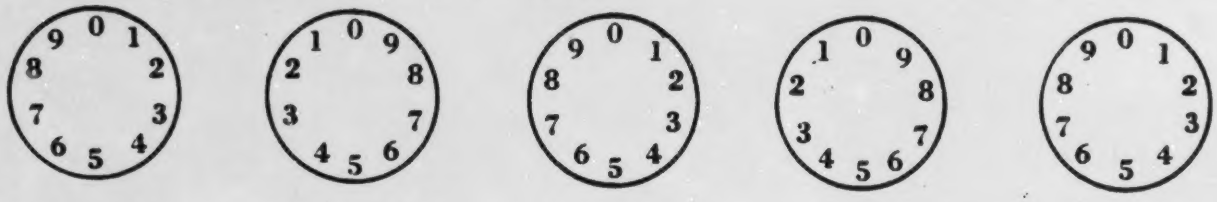
Materials:

Copy of sheets on Page 51 and Page 53

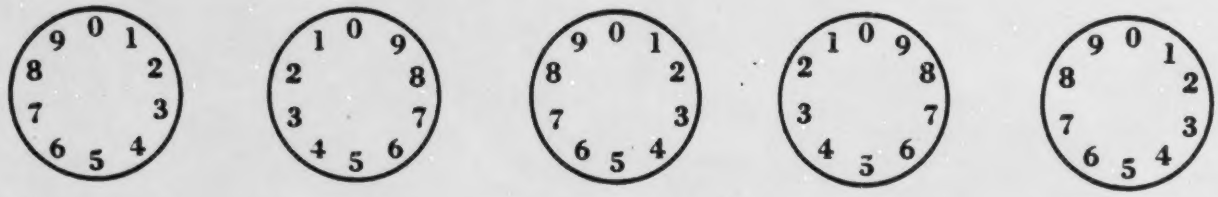
Source: Energy Conservation Activity Packet, Grade 4, Iowa Energy Policy Council, Des Moines, Iowa, 1979

HOW MUCH GAS OR ELECTRICITY DO WE USE?

Name ______________________________

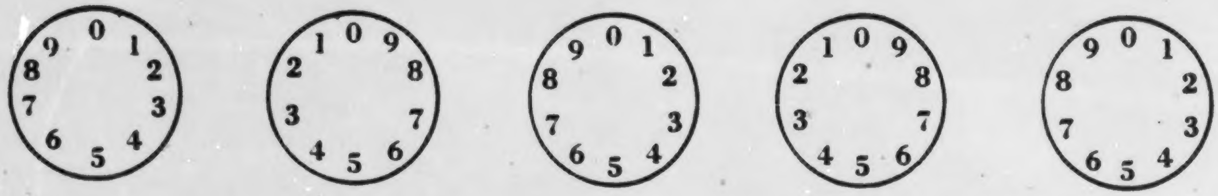


Date __________ **Time** __________ **READING** __________________

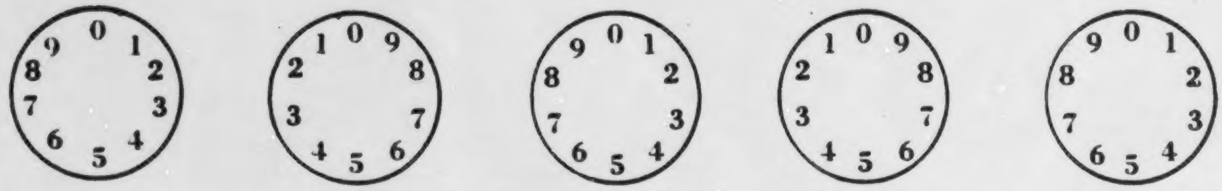


Date __________ **Time** __________ **READING** __________________

TRY TO SAVE ENERGY!



Date __________ **Time** __________ **READING** __________________



Date __________ **Time** __________ **READING** __________________

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council,
Des Moines, Iowa, 1979

Title:

A Visit to the Schools' Heater Room

Level:

Primary and Intermediate

Description:

Students will determine how much gas and electricity is used in the school in a 24 hour period.

Concept:

Public buildings also use energy but in greater amounts than individual homes.

Activity:

Ask the custodian to lead the class on a tour of the school's utility section where the meters for gas and/or electricity are found. Read the meters twice within a 24 hour period and calculate how much energy is used in the school. Find out what other forms of energy are also used in the school for heating and cooling. Determine how much is used during a month and then calculate the cost of heating or cooling the school during a one month period.

How can the students, teachers, and staff save energy costs in the school?

Materials:

copy of meter sheets on page 53
pencil

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy Walk Through the School

Level:

Primary and Intermediate

Description:

Children walk through the school to determine whether energy is used wisely.

Concept:

Efficient use of energy saves resources and money.

Activity:

Plan to take a tour of the school to observe how energy is being used. Begin at the office, go through the halls, into empty classrooms and through the lunchroom area. Develop a check list for each child which could include checking to see whether lights are on/off in unused rooms; windows open when heating on; dripping faucets in classrooms and lavatories; efficient use of refrigeration and ranges/ovens in lunchroom. Compare individual check lists and make recommendations in a letter to the principal and the custodian on how energy might be conserved in the school.

Materials:

pencils
paper

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy Conservation in the School

Level:

Primary and Intermediate

Description:

The custodian, a resource visitor, explains to the students how electricity helps him operate the school.

Concept:

Electricity provides energy to operate the school.

Activity:

Invite the school custodian to come into the classroom and ask him to explain how electricity helps him to do his work in the school. Ask him to explain how his work would be different if he didn't have an "electric helper". How is electricity used in the building? What plans have been made by him and the school principal to save electricity?

Finally ask the custodian to plan with the children ways they can save electricity or other energy in their particular classroom. Suggest to him that they would like to have him visit their classroom every week for a few minutes to tell them how their classroom and the school is doing in its efforts to save electricity and other forms of energy. Or, appoint a different child each week to ask the custodian how the classroom and school are doing.

Materials:

None

Source: The Energy Book, South Carolina Department of Education, Columbia, South Carolina, 1979

Title:

Household Appliance Survey I

Level:

Primary

Description:

The children and their parents will survey the home and draw pictures of all the household appliances that use energy. (Exclude the kitchen if the previous packet was used.)

Concept:

Most households today consume more energy than is realized.

Activity:

Using the worksheet "Electrical Appliances In My Home" ask the children to survey the family living areas (bedrooms, bathroom, living room, dining room, etc.) for all of the appliances in their homes that use energy. Ask them to draw a picture on the lightbulb of each appliance, or they can write the appliance name.

When the children return to school with their sheets, hold a class discussion. Ask the children to put a number "1" by the appliance that is most important to them, a number "2" by the next one and so on. Do this for the first 10. You as the teacher might then wish to collect all the papers and list the top ten favorite appliances or you might want to ask a group of students to work with you. Coalate the information and present it in class the next day. Ask the children if there is anything on the list they could really do without. For example, what could they do if they didn't watch T.V.? Write their responses on chart paper.

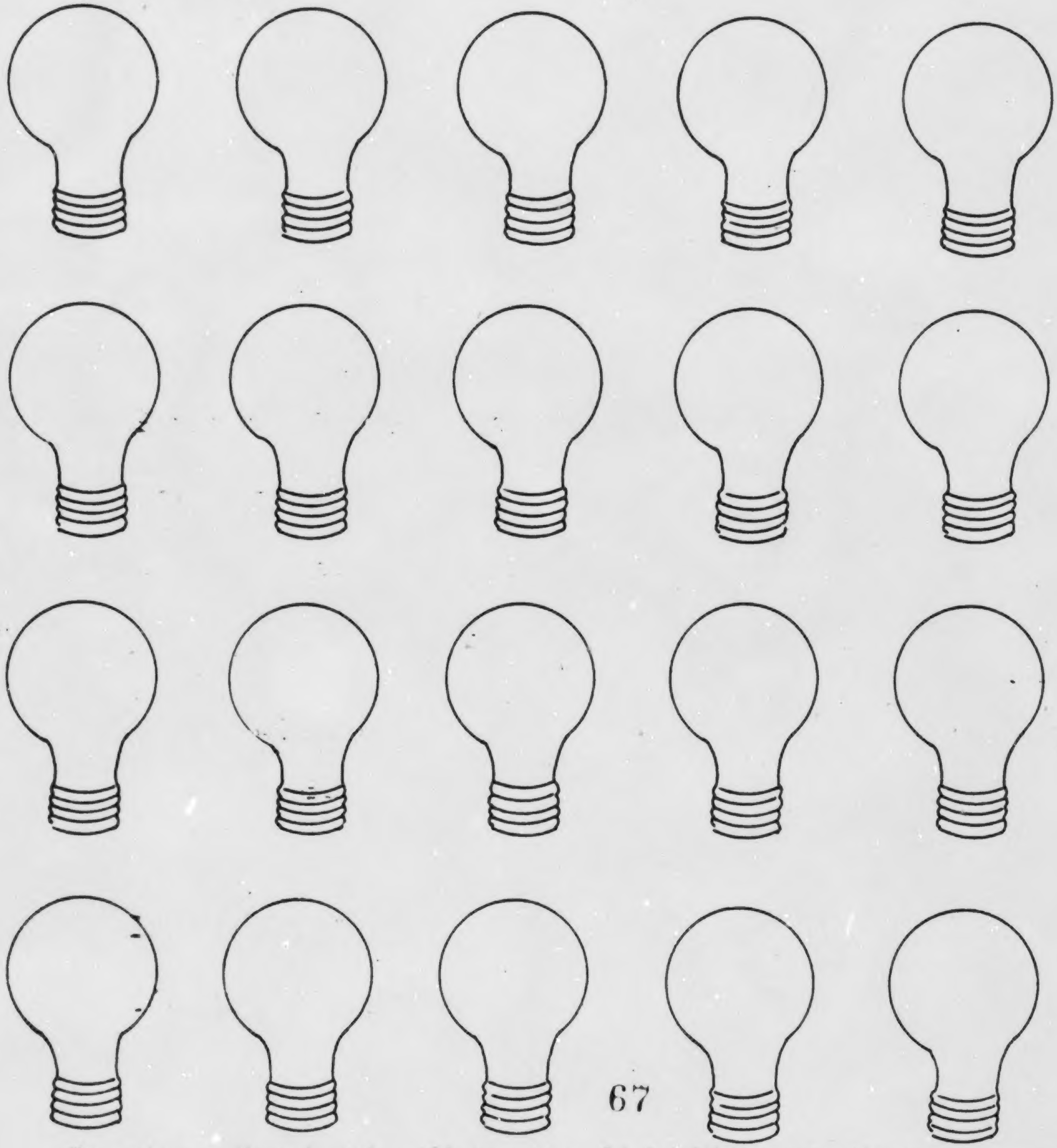
Materials:

Electrical Appliances In My Home worksheet

Source: Energy Activities - Grade 3, National Science Teachers Association, Department of Energy, 1979

ELECTRICAL APPLIANCES IN MY HOME

With the help of your family, list all the electrical appliances in your home. Now, go back and number them in the order of their importance to you.



Now put an x through each appliance you could do without and still have a good life.

Source: Energy Conservation Activities Packet, Iowa Energy Policy Council, Iowa, 1979

Title:

Household Appliance Survey - 2

Level:

Primary

Description:

The children will keep a record of how they used electricity during a 24 hour period.

Concept:

To reinforce the idea that we all consume more energy than we may realize.

Activity:

Using the sheet How Do I Use Electricity, ask the children to record what they used that required electricity and the reason they used it. They should keep track of their electricity use for 24 hours, from breakfast to breakfast for example, and record use at school as well as at home.

Use the information as the basis for an Energy Book. Begin by discussing in class the student's use of energy and focus the discussion on ways they might eliminate or cut down. For example, if they spent a lot of time watching T.V. they might decide they would ride a bike, read a book or play outside. If they used an electric toothbrush they could use a regular toothbrush. Ask the children to draw and color two pictures of themselves; one doing something that consumes energy and the other an alternative to that consumption. Save the pictures for a class Energy Book.

Materials:

"How Do I Use Electricity" sheet

Source: Furlong and Schmidt, C.A.R.E., 1980

HOW DO I USE ELECTRICITY?

	Appliances I used which consumed electricity	The reason I used electricity
(example)	1. Blender	1. Make chocolate shakes
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council
Des Moines, Iowa, 1979

Title:

Household Appliance Survey Graphs

Level:

Primary

Description:

The children will construct a class graph showing the 10 appliances most important to them. A second class graph will show the cost of operating those appliances.

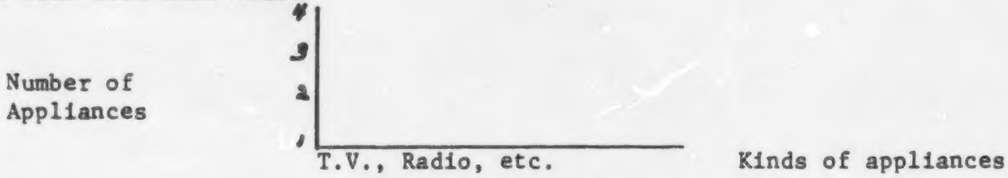
Concept:

To show how much energy is consumed and how much money is spent operating appliances that are both necessities and luxuries.

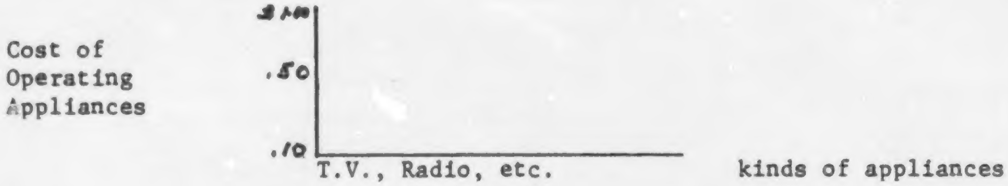
Activity:

Refer to Lesson - Packet 1, p. 33 for directions of graph construction.

Graph 1 will look like this:



Graph 2 will look like this:



Materials:

Chart or graph paper
markers or crayons

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Household Appliance Survey (Home Use and Energy Checklist)

Level:

Intermediate

Description:

The children and their parents will survey the family living areas (excluding the kitchen) to determine the number of energy-using applicances in the home.

Concept:

Most households today consume more energy than is realized. This energy costs money.

Activity:

Using the Home Use and Energy Checklist, on page 63, ask the children to survey their homes for the appliances on the list and have them add any others they may have that are not on the list. Ask them to record how each item on the list helps them.

Using the chart that gives the cost of operating each appliance, the children and their parents can calculate how much it costs them per month and per year to operate all of these appliances. The children should bring that information to school.

Materials:

Home Use and Energy Checklist

Source: ERIC Center for Science, Mathematics and Environmental Education, Ohio State University, Columbus, Ohio, 1976

HOME USE AND ENERGY CHECK LIST

	Number of Hours Used per week	How does it Help You?
Electric Radio		
Portable Radio		
Humidifier		
Telephone		
Lamp		
Television		
Toothbrush		
Pencil Sharpener		
Hair Dryer		
Doorbell		
Vacuum Cleaner		
Furnace		
Water Heater		
Hand Saw		
Saber Saw		
Drill		
Sander		
Porch Light		
Clock		
Sewing Machine		

HOME USE AND ENERGY CHECK LIST (continued)

	Number of Hours Used per week	How does it Help You?
Record Player		
Shoe Polisher		
Movie Camera		
Iron		
Candles		
Broom		
Washer		
Dryer		
Ceiling Light		
Fan		
Mop		
Vaporizer		
Electric Razor		
Fireplace		
Toys		
Flashlight		
Car		
Bell		
Knife		
Electric Blanket		
Adding Machine		
Typewriter		

Title:

Household Appliance Survey Graphs 1 and 2

Level:

Intermediate

Description:

Each student will construct two graphs. The first will show the kinds and numbers of appliances operated by all class members. The second will show the total class cost of operating all of the appliances.

Concept:

Energy use costs money.

Activity:

Refer to page 33 in Packet 1 and Household Appliance Survey Graphs in this section for a description of graph construction.

Materials:

chart paper
crayons or markers

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Shower vs. Bath

Level:

Intermediate

Description:

Children will measure the amount of water required for a shower and a bath and determine which is more efficient. They will calculate the cost of heating the water.

Concept:

Taking a shower saves water and is therefore more economical.

Activity:

Using the sheet "Should you Shower or Bathe?" have the children do this activity as a homework assignment and share the results in class. Tell the children they have several days to complete the assignment.

Materials:

rulers

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council. Des Moines, Iowa, 1979

SHOULD YOU SHOWER OR BATHE?

Things you need: your bathtub, a yardstick, a bar of soap (optional)

*A surprising fact is that if people took showers instead of baths a lot of energy would be saved.

TAKE A BATH. Fill your bathtub with water as usual. Before you step into the tub, measure the depth of the water.

Bath water _______ inches

TAKE A SHOWER. Do this when you need one! Before you begin, close the bathtub drain so the shower water will collect in the tub. When you have finished with your shower, measure the depth of the water that has collected.

Shower water _______ inches

What is the difference in the amount of water you used? _______

*It takes about an ounce of oil (or a cubic foot of gas, or 1/4 kilowatt hour of electricity) to heat a gallon of water. Showering saves lots of energy!

◆

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council
Des Moines, Iowa, 1979

Title:

How Much of the Budget Does Heating Water Take?

Level:

Intermediate

Description:

Children will color in the number of coins to represent energy costs of household appliances.

Concept:

Children will realize that next to the cost of heating the house, heating hot water takes the most money from the energy budget.

Activity:

Using discs to represent pennies, the teacher will demonstrate the total percentage of energy used by each of these household appliances for one year.

Electric Range	15%
T.V.	9%
Clothes Dryer	5%
Water Heater	38%
Room Air Cond.	8%
Refrigerator	20%

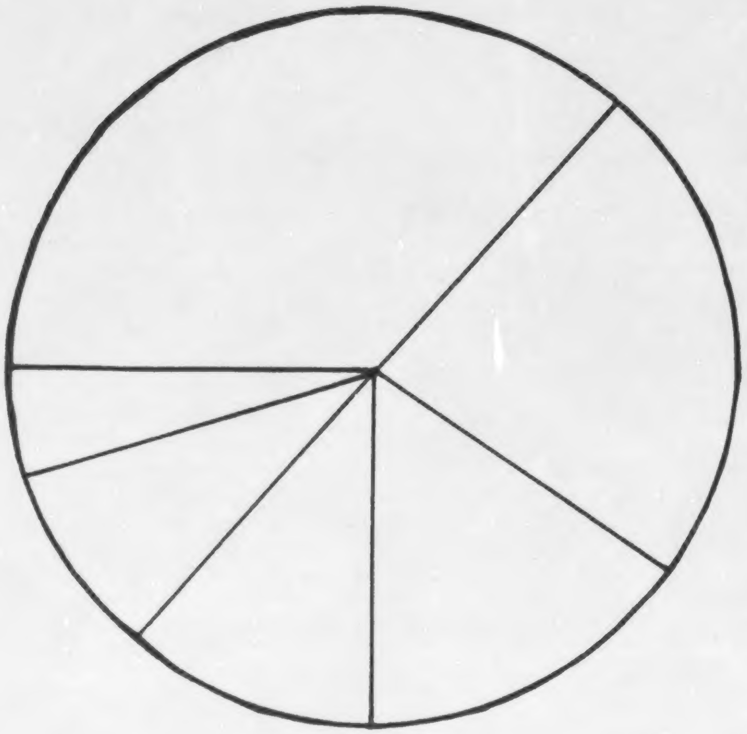
If these discs were pennies, how many pennies from each dollar does it take to operate the above appliances? Give students a copy of the sheet on page 69 Ask them to identify, color, and label each appliance on the graph. Explain the purpose of a color key and have students make one at the bottom of the page.

Materials:

copy of Energy Budget Graph
crayons
pencil
ruler

Source: Networks: How Energy Links People, Goods and Services, Grades 4 and 5, National Science Teachers Association, U. S. Department of Energy, 1979

ENERGY BUDGET GRAPH



Source: Energy Activities, U. S. Department of Energy, 1979

Title:

Tips for How to Save-A-Watt

Level:

Primary or Intermediate

Description:

The children will brainstorm ways to conserve energy.

Concept:

Energy can be used more efficiently. This saves energy and money.

Activity:

Have the class brainstorm a list of all the ways to conserve energy in the home. Record their answers on chart paper. Accept all ideas.

The list should include suggestions such as turning off lights, keeping windows closed in the winter, turning down the thermostat, repairing leaking faucets etc. Classify the list according to the kinds of energy being consumed. Then ask the children to draw pictures of themselves doing things to conserve energy and make a class Energy Saving Book.

Materials:

chart paper
crayons
paper

Source: Energy Conservation Activity Packet Grade 3
Iowa Energy Policy Council, Des Moines, Iowa, 1979

Title:

Energy Inventory

Level:

Primary and Intermediate

Description:

The children will keep track of items in the home that get thrown out but could be reused.

Concept:

Recycling and conserving is a more efficient use of resources and saves money.

Activity:

Ask the children to keep a record of things at home that get thrown out but could be used again. Suggest that they do this activity with their parents and that they monitor the trash for several days. The younger children might draw pictures. Examples might be glass bottles and jars, paper bags, plastic containers, plastic bags, aluminum foil, etc.

In class, ask the children to share their lists. Find the major categories and discuss the source of each item and why it is important to conserve it. For example, plastic is a petroleum based product and also takes energy to produce. Paper comes from trees, a natural resource - although new trees can be planted it takes a very long time before they can be harvested for use and the demand for paper products exceeds the supply.

The crossword puzzle and seek and find may be used as extensions of this lesson.

Materials:

paper
pencil

Source: Furlong and Schmidt, C.A.R.E., 1980

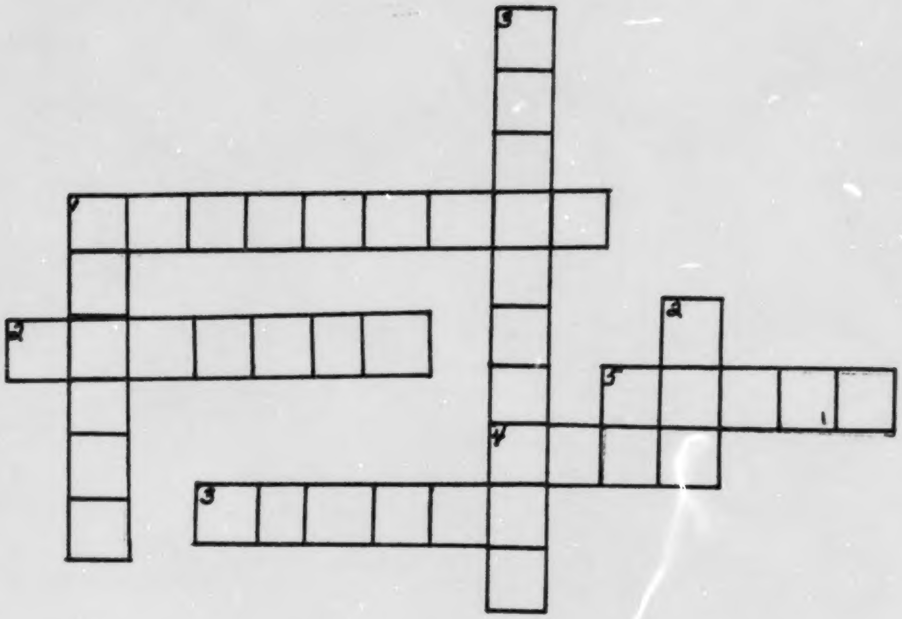
SEEK and FIND!

O	P	N	R	O	T	O	M	T	O	N
F	H	E	A	T	E	R	A	D	I	A
F	Q	L	D	O	L	O	E	M	O	T
S	O	A	I	D	E	V	S	T	E	I
M	T	H	O	A	V	A	C	U	U	M
O	E	E	S	I	I	L	O	L	L	O
K	H	O	R	L	S	E	M	U	E	V
E	A	L	A	E	I	S	P	O	L	E
Y	I	P	I	S	O	R	E	F	O	N
S	R	S	L	S	N	F	O	A	G	G
D	D	R	Y	E	R	E	O	N	O	S

Find the following words in this puzzle. They can be either across, down, or on the diagonal.

Radio
Television
Hair dryer
Iron
Vacuum
Stereo
Fan
Heater

Crossword Puzzle



ACROSS

1. I use a __________ on my hair after I take a shower.

2. My mother uses our new __________ to clean the rugs.

3. My brother always listens to records on his __________ too loud.

4. If my father's shirt is wrinkled, my mother uses the __________.

5. I like to listen to the __________ while I do the dishes.

DOWN

1. If it is really cold in my room I like to turn the __________ up higher.

2. In the summer the __________ keeps my room cool.

3. I am allowed to watch __________ for two hours each night.

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Grocery Bag Survey

Level:

Primary and Intermediate

Description:

The children will make a collage of all the unnecessary packaging they can find.

Concept:

Extra packaging, made from paper and plastic, is a waste of energy and resources.

Activity:

Ask the children to collect as much unnecessary packaging material as they can find and bring it to school. This is an activity that can involve the parents, as parents and children can look at items they buy at the market. For example, the cardboard box around a toothpaste tube, the plastic around some soda bottles, styrofoam meat trays, etc. Collect the items and have the children make a class bulletin board of all the excess packaging.

Explain as part of the discussion, that energy is used in the production of all of these items and that it is also a drain on resources to produce them.

Materials:

packaging materials
stapler or glue

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council, Des Moines, Iowa, 1979

3.

GAS AND GO!

PRE-ASSESSMENT: Gas & Go

What Do You Know About Energy?

You were a contestant on a television quiz show. You have won a new automobile and you may select whatever automobile you want. Would you...

...Choose a car with air conditioning?
...Select the largest car you see?
...Select a car where everything is automatic?
...Select a car that gets 35 miles to a gallon of gas?
...Other.

In order to import fewer barrels of oil we should...

...Use plastic sandwich bags.
...Eat fresh fish instead of fish sticks.
...Use a bicycle instead of an automobile.
...Organize car pools.
...Take the train or the bus instead of drive.
...Eat hamburgers at McDonalds.
...Buy soda in glass bottles and return them.
...Eat canned fruit instead of fresh fruit.
...Reuse paper bags.
...Take a shopping bag to the supermarket.

Answer Yes or No...

...Coal can be used instead of oil.
...Coal is mined from under the ground.
...Coal and oil are called fossil fuels.
...A fossil fuel takes millions of years to make.
...Many of the things we use and eat are made from oil and take oil to produce.
...Oil is used mostly to make gasoline.
...When a car uses gasoline it is converting chemical energy to mechanical energy.
...When a car burns gasoline there is waste.
...When oil and coal are used to produce energy they pollute the air.
...Gasoline is the major source of energy in our transportation system.

Title:

What Do You Know About Energy: (An Energy Review)

Level:

Primary or Intermediate

Description:

The children will classify objects according to the kind of energy that is produced.

Concept:

This is a review of the energy terms mechanical, chemical and electrical as they relate to transportation.

Activity:

Begin the activity by reviewing the terms mechanical, chemical, and electrical energy. Display the objects listed below and ask the children to record their answers as you hold up each object. Ask the question, "Does this work using mechanical, chemical or electrical energy?" After the children have recorded their answers hold a class discussion and go over the results. You may want to draw a picture of the objects on chart paper and record the kind of energy used beside each picture.

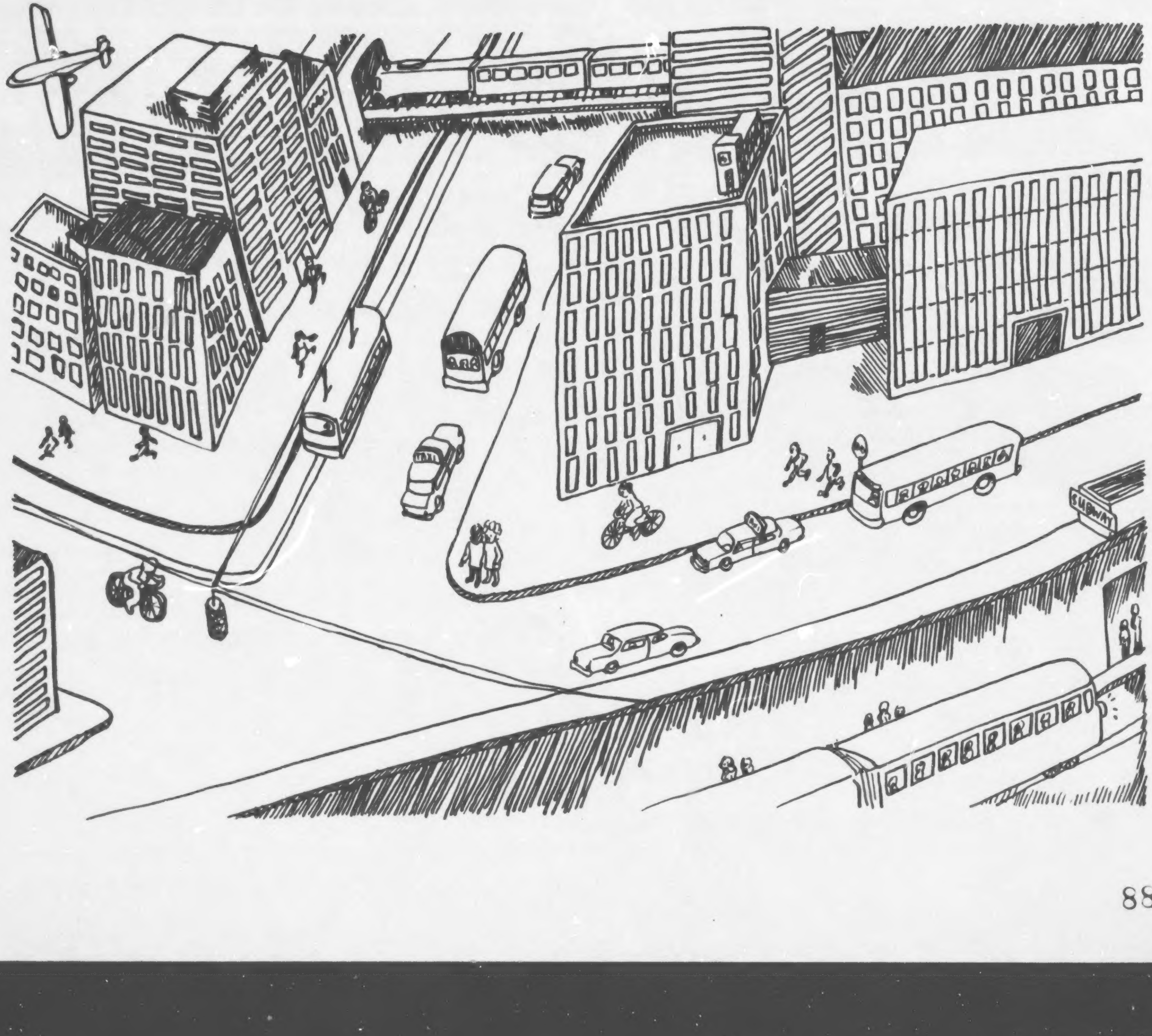
After the objects have been categorized, explain that our transportation system depends on these three kinds of energy. Ask the children if they know what kind of energy is required to pedal a bicycle, run an automobile or operate a trolly. When they have concluded that a bicycle is an example of mechanical energy, an automobile is an example of chemical energy and a trolly is an example of electrical energy, hand out the Urban transportation scene as a follow-up activity.

Ask the children to look at the picture and decide the kinds of energy used in each picture. They can mark the pictures M, C, and E, or perhaps color the pictures accordingly.

Materials:

lamp
flashlight
match
yoyo
paddleball
iron
wind-up toy
pin wheel
battery and ball
Urban transportation scene

Source: Furlong and Schmidt, C.A.R.E., 1980


SUBWAY

Title:

Energy Changes to Motion and Sound

Level:

Primary and Intermediate

Description:

Students connect wires from battery to door bell to observe how energy is converted into different forms.

Concept:

Chemical energy in a battery is converted into mechanical energy which produces sound.

Activity:

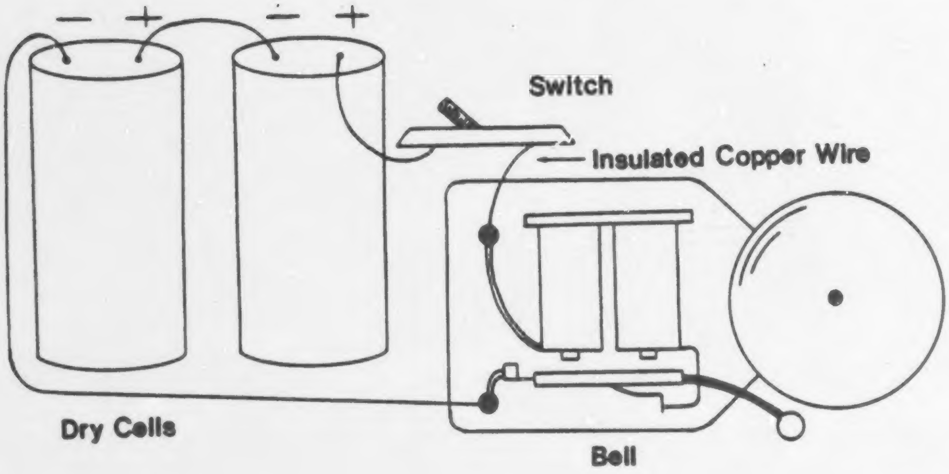
Divide students into small groups and distribute two dry cell batteries, two lengths of wire, a switch and a bell to each group. Ask the students if they can solve the problem of making the bell ring. When all groups have been successful, ask the students to explain the "energy chain" which has happened. What kind of energy source is the battery? (chemical) What kind of energy does the energy in the battery convert to first? (electrical) What makes the bell ring? (mechanical energy) What does the mechanical energy produce? (sound) Where does the sound go? (It dissipates into the environment) Is the battery a renewable or a non-renewable source?

Materials:

two dry cell - 6 volts each, per group
insulated copper wire
bell or buzzer
switch
Diagram on page 79

Source: Transportation in the City, Grades 8, 9, National Science Teacher's Association, U. S. Department of Energy., 1979

WIRING DIAGRAM



—
+
—
+
Switch
Insulated Copper Wire
Dry Cells
Bell

Title:

How is Coal Made?

Level:

Primary and Intermediate

Description:

Students will observe a simplified process of how coal is formed.

Concept:

Energy is a commodity which is neither created nor destroyed, but is converted from one form to another.

Activity:

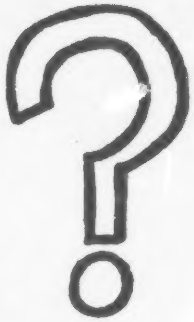
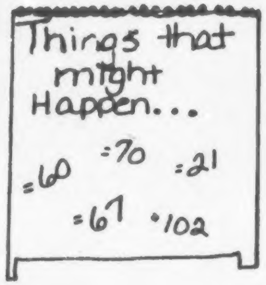
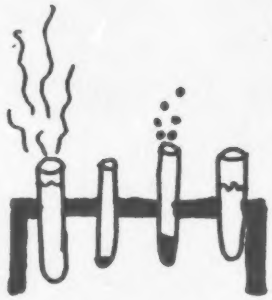
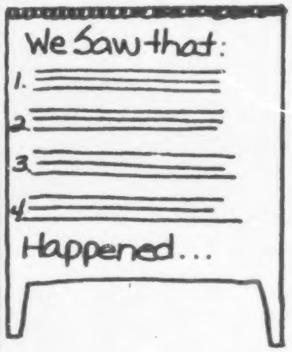
Make a display of ferns, peat and coal and ask the students what these objects have in common. Explain that coal is formed from peat and ferns under pressure of soil over a period of millions of years. Explain that the students will observe part of this process in the classroom. Fill a ten gallon aquarium with water and add enough peat moss to make a one inch layer. Examine the aquarium for one week using the chart on the next page. Each child can fill in the information as the experiment proceeds. A daily class record of the observations in column #3 may also be kept. Determine why the changes happened or did not happen. After a week, sift moderately fine sand over the peat to the depth of one inch, and when the sand settles, add an equal depth of peat. Repeat the process for as long as desired, or until several successive layers have formed. You may wish to show a filmstrip about the formation of coal at this point. Discuss how the layers of sand (soil) press on the decaying materials to form the substance which will eventually turn into coal. Coal is called a fossil fuel because it is made from the remains of ancient plants over millions of years. Other fossil fuels are oil and natural gas which are formed from animal remains. Fossil fuels must be burned before energy can be realesed. Once they are burned, they are gone. This is why coal, oil and natural gas are non-renewable resources.

Materials:

ferns
pictures of ferns
sand
peat moss
coal
10 gallon aquarium
charts of geologic times

Source: "Energy Activities for the Classroom, ERIC-Ohio State University, Columbus, Ohio, 1977

Source: Adapted from Solar Energy Curriculum, U. S, Department of Energy, 1979

 **The Problem**	 Things that might Happen... =60 =70 =21 =67 =102 **Predicting**	 **Observing**	 **Doing the Experiment**	 We Saw that: 1. 2. 3. 4. Happened... **Drawing Conclusions**
How is coal formed from plants, soil and water?	The peat will decay and the sand will compress the peat into layers.	1. Color of water. 2. Appearance of peat. 3. Odor of water.	Layers of sand were added to the peat, in water, in an aquarium.	Pressure from sand, forms layers of decaying peat. If this process were allowed to continue for millions of years under great pressure coal would form

Title:

Where is Coal Found?

Level:

Intermediate

Description:

Students will find answers to facts about coal, independently, using library resources.

Concept:

Coal is a resource found all over the world. Although it is plentiful, it is a non-renewable resource, which requires mining, and transportation to be used. Coal is a major source of electrical generating plants. It is also a major source of pollutants.

Activity:

After the students have learned how coal is formed, they or the teacher can generate a list of questions about coal. Write each question on a 3 x 5 card and suggest sources where the information can be found, in the classroom or school library. The students will write the answers to the question on the cards and cite the name of the source in which the information was found. (see next page for suggested questions). Facts about coal may be shared with the class.

Materials:

3 x 5 cards
pencils
resource materials

Source: Furlong and Schmidt, C.A.R.E., 1980

INDEPENDENT STUDY QUESTIONS - WHERE IS COAL FOUND?

1. Find at least two places in the world where coal is found.
2. Find at least two places in the United States, other than Pennsylvania, where coal is found.
3. Where is coal found in Pennsylvania?
4. Find two ways in which coal is transported.
5. Find one fact about how coal is mined.
6. What was the major use of coal fifty years ago?
7. How is coal used today?
8. How many products can you find which are made from coal?
9. How does coal pollute the air?
10. How does coal pollute the water?
11. Give two reasons why you would or would not like to be a coal miner.
12. Find two reasons why you think mining coal is dangerous.
13. Find a least one disadvantage/advantage of using coal to heat a house.

Title:

Air Pollution

Level:

Intermediate

Description:

Students will observe the effects of pollution on plant life.

Concept:

The production and distribution of energy have environmental and economic consequences.

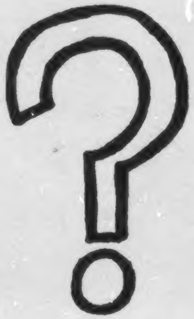
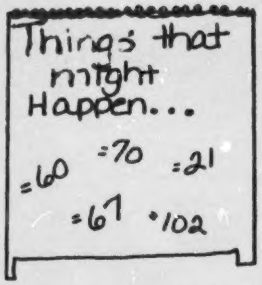
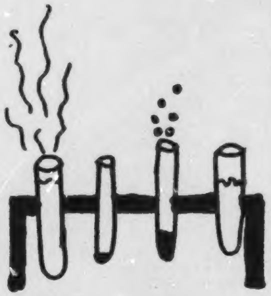
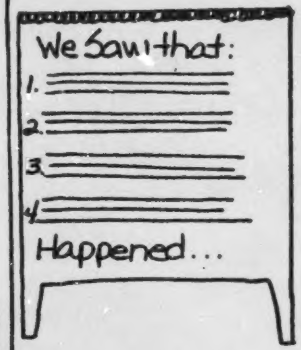
Activity:

Add one inch of gravel to two one-gallon jars. (1-1/2 inches of sterilized potting soil.) Plant two species of a succulent plant in each jar making sure that the plants are equal in size and condition. Drill a hole into one of the jar lids and insert a rubber plug into the hole. Moisten soil in both jars, place plastic wrap over the jar mouth and screw on lid with plug. Place lid on the other jar (plastic wrap is not necessary) and put covered jars in indirect sunlight for several days until plants have attained equalibrium. Grind a gram of soft sulphur coal and place in a large test tube. Insert a small glass tube into a one-hole stopper and connect rubber tubing to the protruding end. Put the entire stopper into the end of the test tube. Attach a hypodermic needle to the tube and insert into the plug of jar. Heat the test tube containing the coal until all of the coal is burned. Do this for a two week period. Observe the two jars daily and record observable changes. Distribute a copy of the observation chart to each child. Have them complete the information at the beginning, throughout, and at the end of the experiment. Discuss the effects of burning coal and other fossil fuels on the environment. What does burning gasoline produce and what are its pollutants?

Materials:

test tube
finely ground coal
hypodermic needle
rubber plug
rubber tubing
4 succulent plants
gravel
potting soil
bunsen burner
stand
hypothesis sheet

Source: Energy in our Society, Energy Education Advisory Council, Philadelphia Electric Company, Philadelhpia, PA, 1979

 The Problem	 Things that might Happen... =60 =70 =21 =67 =102 Predicting	 Observing	 Doing the Experiment	 We Saw that: 1. 2. 3. 4. Happened... Drawing Conclusions

Source: Adapted from Solar Energy Curriculum, U. S. Dept. of Energy, 1979

Title:

Source of Energy - Past and Present

Level:

Intermediate

Description:

Students will compare graphs of energy sources in 1900 and 1973.

Concept:

Sources of energy have shifted from coal to oil and natural gas since 1900.

Activity:

Distribute a copy of the sheet with the two graphs of Sources of Energy. Questions may be answered independently or as a class. Students may also generate additional questions from the graphs.

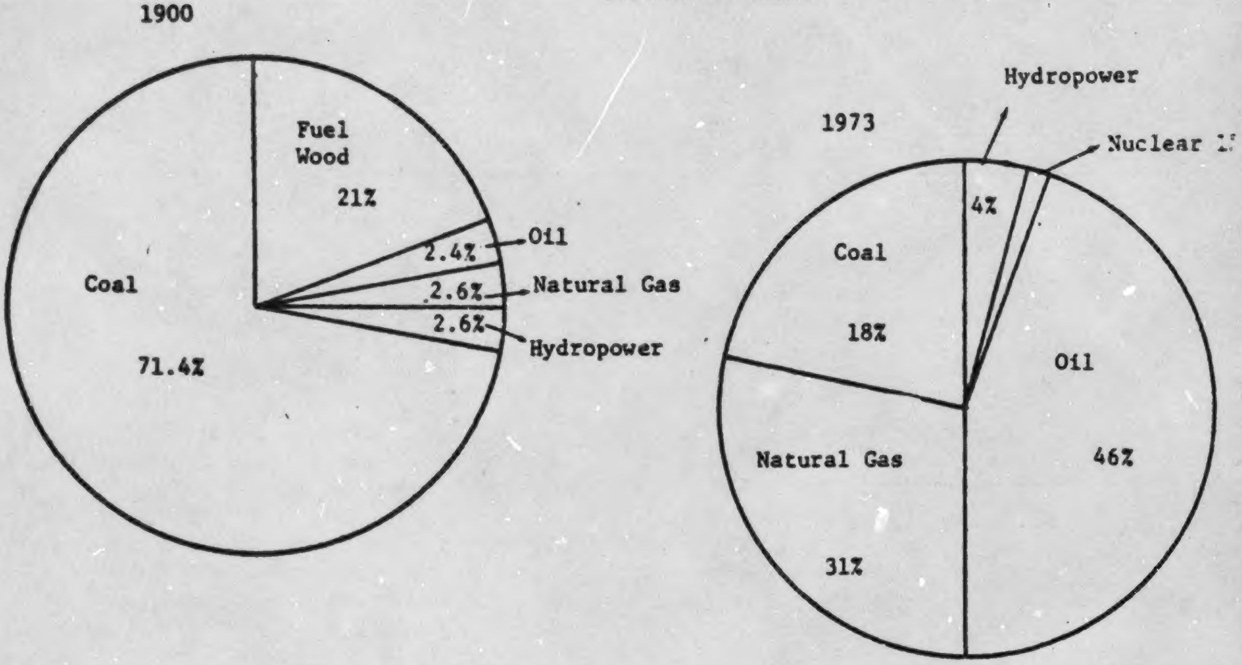
Materials:

activity sheets

Source: Mathematics in Energy, Grades 8-9, National Science Teachers Association,
U. S. Department of Energy., 1979

Study the two circle graphs below and answer the questions which follow.

SOURCES OF ENERGY



a. In 1900 which source of fuel was used most?	(a. Coal)
b. What source of fuel was used in 1900 but not in 1973?	(b. Fuel wood)
c. What source of fuel was used in 1973 but not in 1900?	(c. Nuclear)
d. In your opinion, why was more natural gas used in 1973 than in 1900?	(d. Possible answers: Industrialization-more capable of obtaining it.)

Source: Energy Activities, U. S. Department of Energy, 1979

Title:

The Story of Oil

Level:

Primary and Intermediate

Description:

An introduction into the production and refining of oil.

Concept:

Oil, a non-renewable resource, found in certain parts of the world, has become the basis for our life style.

Activity:

Distribute a copy of Olivia Oil to each student and develop a directed reading activity. Ask students to answer questions such as: 1) What is "crude oil"? 2) How is oil transported? 3) Where is oil refined? 4) What are some of the different kinds of fuel refined from oil? After the discussion, show an overhead copy of page 90 which shows the forms of fuel derived from crude oil. Brainstorm with the children on the many ways that crude oil products are used in daily life. They may cut out and draw pictures of these ways to make a bulletin board display, montage or mobile. Part of the discussion should be centered on where oil is found in the world. This may lead into an independent study, an activity in which children find out which countries produce oil and then placeing pins on a map of the world which show the oil producing countries.

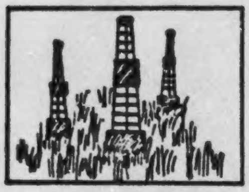
Materials:

Olivia Oil handout sheet
"crude oil" transparency
magazines
drawing paper
scissors

Source: Transportation and the City Grades 8,9, National Science Teachers Association, U. S. Department of Energy.

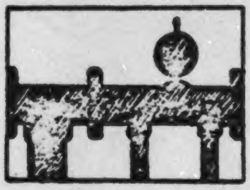
The Story of Olivia Oil

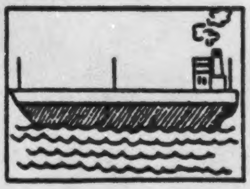
Hi! I'm Olivia Oil. People tell me that I am very important because I help people. To find out how I can be useful, read my story.

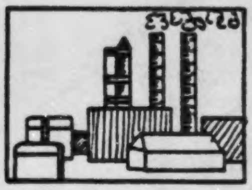


To find me you must look in the ground. First dig a deep hole. Then use a pump to pull me out of the ground. Now I am called "crude oil".

Next I go on a trip. I am put in a pipeline (like the Alaskan Pipeline). Or else I am put in a big ship called an oil tanker. Then I am sent to an oil refinery.

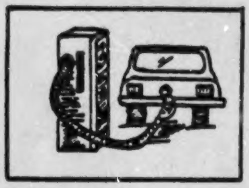


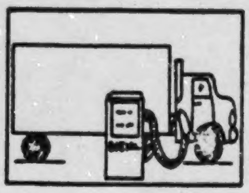


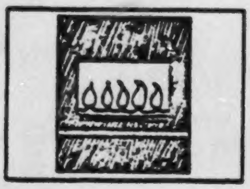


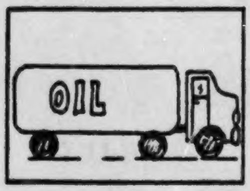
An oil refinery is the place where I am turned into all different kinds of fuel.

Some of me is changed into gasoline to be used in cars, buses, and taxis. Some is made into diesel fuel for use in trucks, cars, and ships. Another part of me is changed into heating oil that can be used to keep houses warm in the winter.





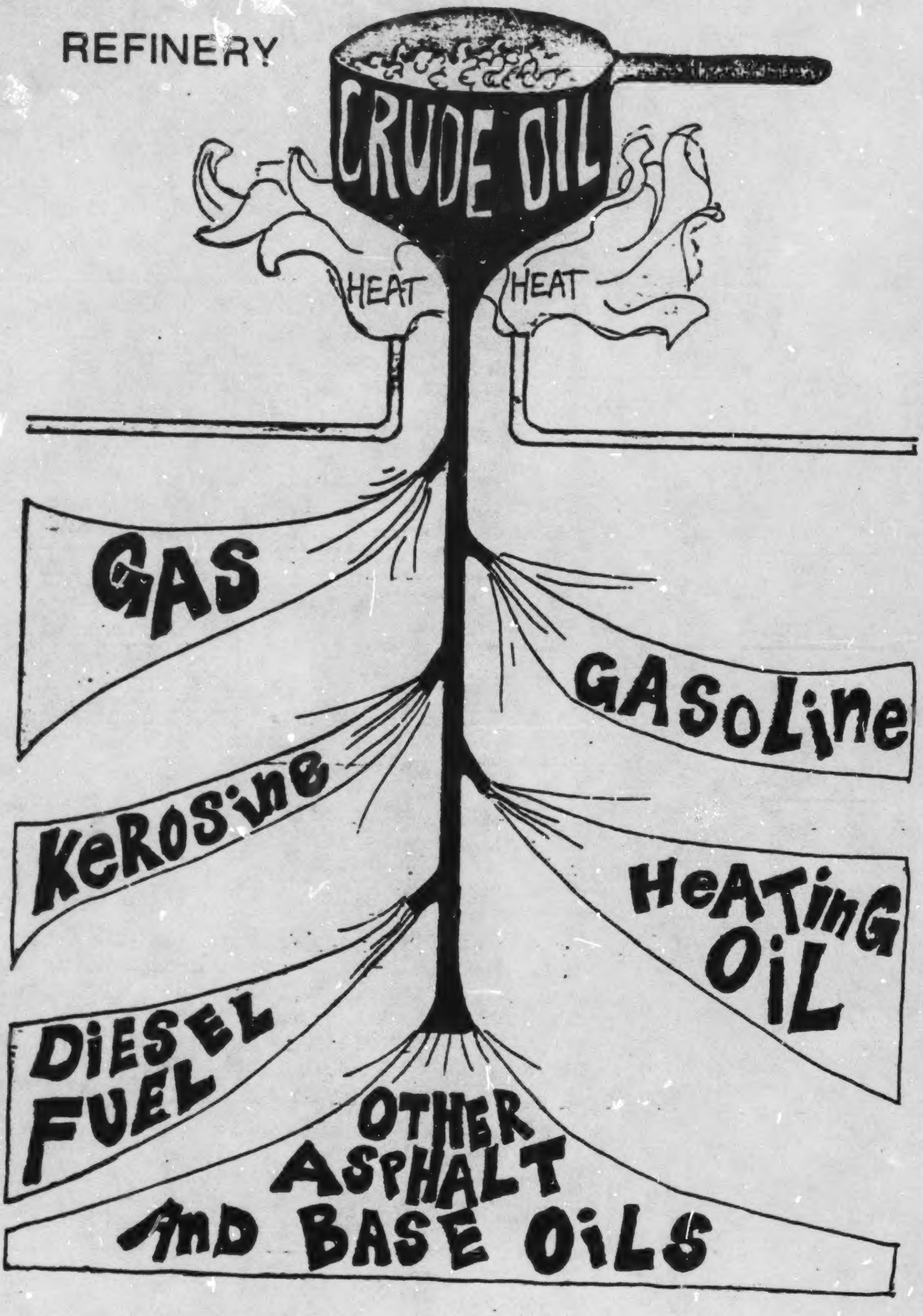




From the refinery, I travel by truck to wherever I am needed to do my job.

Source: Energy Activities, U. S. Department of Energy, 1977

REFINERY


CRUDE OIL
HEAT
HEAT
GAS
GASoLine
KeROSine
HeATinG OiL
DiESEL FUEL
OTHER ASPHALT AND BASE OiLS

Source: Energy Activities, National Science Teachers Association, U. S. Department of Energy, 1977

Title:

A Little Drip - A Big Waste

Level:

Intermediate

Description:

Students will calculate the amount of water escaping from a leaky faucet.

Concept:

Although each drop of water from a leaky faucet is tiny, the drops can add up to thousands of gallons of water during a year. If the leaking water is hot, it also wastes the energy used to heat the water.

Activity:

Find a leaky faucet or adjust the faucet to produce a steady drip Place a measuring cup beneath the dripping faucet and collect 15 minutes worth of drip. Here are the steps to calculate the amount of wasted energy:

1. If you collect 4 ounces of water in 15 minutes - multiply 4 ounces x 4 = 16 ounces per hour.
2. Multiply 16 ounces by 24 hours = 384 ounces per day.
3. Multiply 384 ounces per day by 365 days = 140,160 ounces per year.
4. Divide 140,160 ounces by 128, the number of ounces in a gallon = 1,095 gallons per year of wasted water.

If the drips are hot, you are wasting:

Gas - 1. 1095 x 0.84 = 920 cubic feet of gas or $4.00 per year

Oil - 2. 1095 x 110 = 9.95 gallons of oil or $10.00 per year

Electricity - 3. 1095 x 0.25 = 274 kilowatt-hours or $16.50 per year

Multiply the cost of one leaking faucet by the number of faucets in a home or by the number of faucets in a school.

Materials:

paper
pencil
8 oz. glass or plaster graduate measuring cup
faucet
clock

Source: Energy Conservation Activities Packet, Energy Policy Council, Des Moines, Iowa, 1979

Title:

Oil Makes Heat and Light

Level:

Primary and Intermediate

Description:

Students observe a wick burning in salad oil.

Concept:

Energy is neither created nor destroyed. It is converted from one form to another.

Activity:

Remove a wick from a small (birthday) candle by cutting away the wax. Remove the excess wax from the candle by gently bending the wick. Put the wick in a wad of clay and attach to the bottom a small glass. Pour an inch or two of salad oil into the glass and light the wick. Ask children to hypothesize what will happen. The exposed wick will burn down quickly until it reaches the top of the oil. The flame will remain on top of the oil until the oil is used up. Try to estimate how long the flame will burn. Ask children to place their hands over the glass to feel the heat and to also observe the light. Ask them what is the energy in the salad oil converting to? Ask them what will happen when the oil is used up? Where will more oil come from?

Materials:

glass
wick
salad oil
matches

Source: Furlong and Schmidt, C.A.R.E., 1980,

Title:

It Takes Oil to Make Oil. (or What Products are Made from Oil)

Level:

Primary and Intermediate

Description:

The children will classify objects to determine what things are made from oil or require energy in their production.

Concept:

Oil is needed for many things in today's society. Some are necessities, others are not.

Activity:

Using the items listed below ask the children to brainstorm ways these objects are alike and different. Accept all answers and record their answers on chart paper. Classify the responses in as many ways as possible.

Now, divide the objects into two groups A and B. Explain that there is something different between the two groups. If they do not guess (and they may not) explain that everything in group A requires petroleum energy in its production, and everything in B is made from petroleum feedstock (chemically converted from oil to man-made products).

A. can of tuna fish
paper
aluminum can
glass bottle
piece of bread

B. Petroleum Jelly
record
transistor radio (plastic)
plastic wrap
plastic spoon
styrofoam tray
lipstick
candle
fertilizer
styrofoam
nylon
rayon

For example, explain that bread requires oil in the form of gasoline for harvesting the grain, running the machinery that grinds it into flour and the appliances it takes to mix dough and bake bread. Explain that plastic is a product made from oil.

Divide the children into two groups. Ask one group to brainstorm their own list of oil based products, the other a list of products that require oil to produce. When they have finished, check the lists for accuracy. Shifting categories when necessary. Post the lists and use for the next lesson.

Materials:

listed above

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Which Budget is Better?

Level:

Primary

Description:

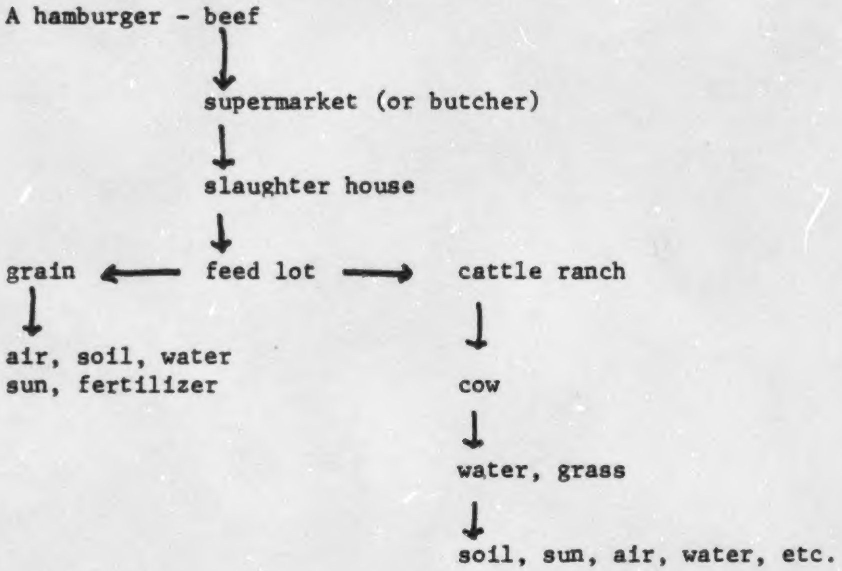
Children will trace the origin of their favorite food.

Concept:

To create an understanding of how much energy is required to produce food and bring it to the table.

Activity:

Ask each child to name his/her favorite food. Write the responses on the board and choose the four of five most popular to work on. Trace the origin of the foods and diagram it on the board. For example:


A hamburger - beef
supermarket (or butcher)
slaughter house
grain
feed lot
cattle ranch
air, soil, water
sun, fertilizer
cow
water, grass
soil, sun, air, water, etc.

Each step requires energy in some form. Oil is required to make fertilizer and in the form of gasoline to transport the cattle and run the appliances necessary.

Source: Adapted from: All Around You - An Environmental Study Guide, Bureau of Land Management, U. S. Department of The Interior, 1973

Title:

Which Budget is Better?

Level:

Intermediate

Description:

The children will trace the steps required to process foods and become familiar with the amount of energy required to do so.

Concept:

It takes more energy than we realize to put food on the table. The more steps required the greater the energy consumption.

Activity:

Using the sheet "Which Budget is Better", discuss each series of steps with the children so they have concrete examples. For example, the 3 step process requires cooking, cooking uses gas or electricity, therefore adds extra energy consumption. The 6 step process would include fresh fruits or vergetables found at the market or a roadside stand. The 12 step process requires energy at each step because - (trace the process with something like green beans or carrots).

After they have discussed the list ask the children to illustrate the examples. It would be best to divide them into groups, with perhaps two groups working on the same process but using different foods. The groups illustrating the longer processes might want to tape several sheets of paper together or if you have access to craft paper could create a mural to give the impression of how the process expands as steps are added.

Materials:

"Which Budget is Better" sheet

Source: Adapted from: Energy Conservation Packet, Iowa Energy Policy Council, Des Moines, Iowa, 1979

WHICH BUDGET IS BETTER?

3. eat it
2. cook it
1. grow a vegetable in your own garden

2. eat it raw
1. grow a vegetable in your own garden

6. eat it
5. take it home and cook it
4. you drive to market and buy it
3. refrigerates it at the market
2. transports it to market
1. someone else grows a vegetable

12. eat it
11. throw away package
10. thaw it and cook it
9. take home and put in freezer
8. you drive to market and buy it
7. market keeps if frozen
6. refrigerated truck takes it to market
5. it is frozen
4. it is packaged
3. it is sliced by a machine
2. transports it to a processing plant
1. someone else grows a vegetable

Source: Energy Conservation Packet, Iowa Energy Policy Council, Des Moines, Iowa, 1979

Title:

What Are Your Energy Habits?

Level:

Intermediate

Description:

The children will evaluate their energy "habits" and discuss why the suggestions will save energy.

Concept:

Since energy in the form of oil is used to process and produce many products energy can be conserved by recycling products. This also saves money ?

Activity:

Using the list entitled Energy Habits discuss with the students why doing each of these things conserves energy. Ask the children if they can add to the list. The children can then choose one item on the list, design and illustrate a poster that shows a person conserving energy by one of these methods. Posters can be displayed around the room.

Materials:

Energy Habits list
construction paper or poster board
crayons

Source: Energy Conservation Packet, Energy Policy Council, Des Moines, Iowa, 1979

ENERGY HABITS

Evaluate your habits. Then make a contract with yourself regarding one of the habits. If you wish, have your family make the contract so everyone will work on it.

1. Avoid buying aerosol cans.
    - dangerous
    - 16% of the cost for the product goes for the container
2. Buy all-aluminum cans.
3. Use and reuse each piece of aluminum foil before recycling it.
4. Buy only returnable bottles and return them.
5. Reuse glass jars.
6. Do not accept plastic bags at the grocery story or at the dry cleaners.
7. Return styrofoam egg and meat containers to the stores where you purchased the items.
8. Do not buy frozen foods in plastic cooking pouches.
9. Take your own shopping bags to the store.
10. Write on both sides of paper.
11. Use cloth napkins, towels.
12. Do not throw away leftovers. Use for lunches or add to pet food.
13. Use cloth handkerchiefs.
14. Reuse wax paper liners in cereal boxes for wrapping other items.
15. Save and bundle newspapers.

Title:

How Do We Use Gasoline?

Level:

Primary

Description:

The children will discuss the duties of the gas station attendant. They will perform an automobile pantomime.

Concept:

Automobiles and trucks require gasoline to operate and are one of the primary consumers of oil. The larger the vehicle the more gasoline it requires.

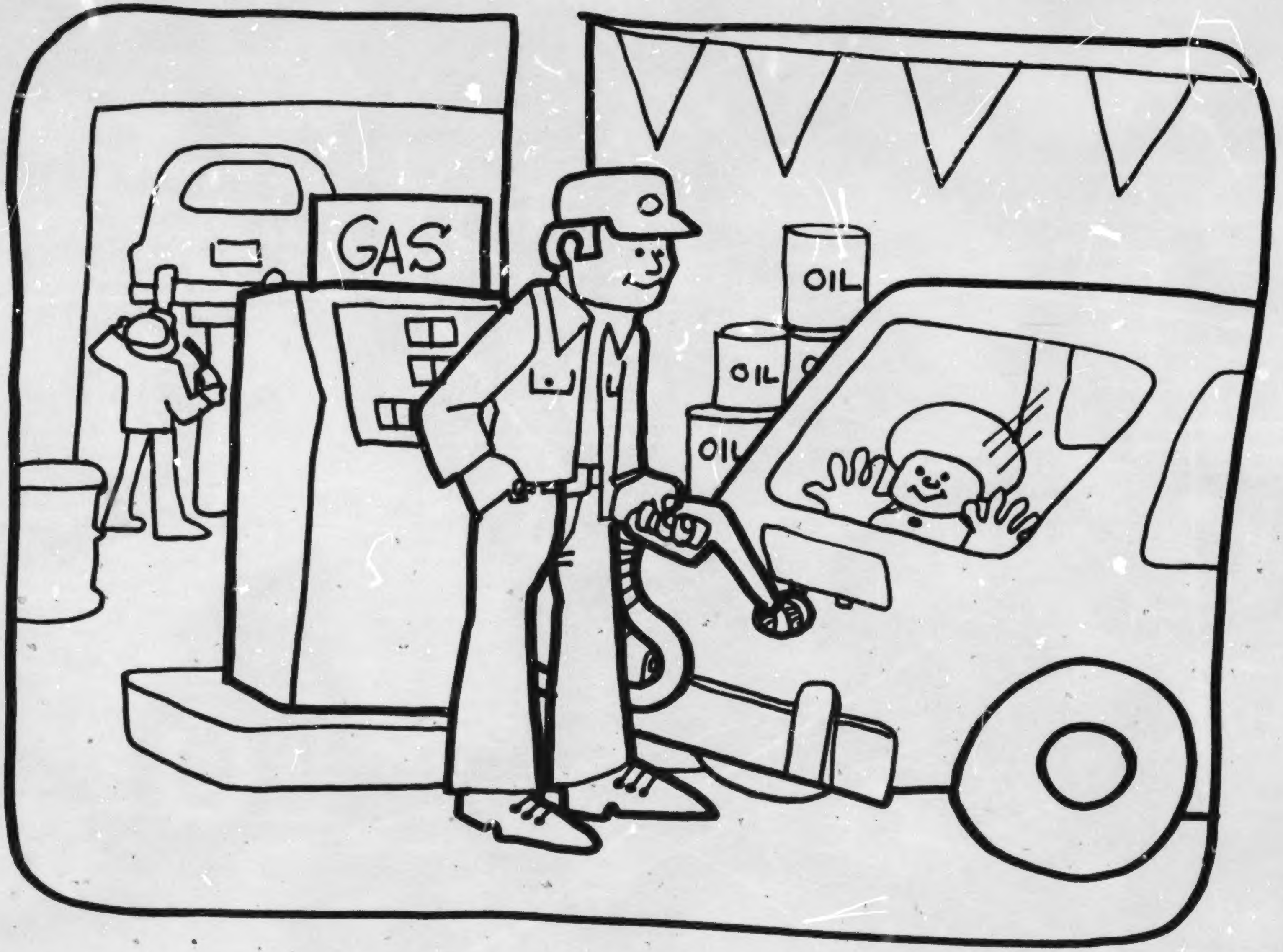
Activity:

Show students the picture of the gasoline station attendant. Ask questions to develop the lesson:

1. Where is the automobile? (gasoline station)
2. Who is the person standing? (gasoline station attendant)
3. What is the person doing? (pumping gasoline)
4. What is the source of the gasoline being pumped? Do you remember what source gasoline comes from? (oil)
5. What else does the gasoline station attendant do? (check oil, and water, fill battery, wipe windshields, etc.)
6. Why is this person's job important to the community? (people need gasoline for cars, lawn mowers, etc.)
7. What would happen to this person's job if there was no more gasoline? (he would lose it. He wouldn't have any money)
8. What can people in the community do to save gasoline? (car pool, walk, ride bikes, take fewer trips, drive slower, etc.)

An automobile Pantomime: Tell children they might like to be parts of a car. They are to come up to the front of the room and make themselves look like a certain part of the car. A child may choose to become the motor, and other children to be the front end, back end, four wheels, and a driver. Ask: What do we need to make the car go? (gasoline). Who puts gas in the car? (gasoline station attendant). Have a child volunteer to put gasoline in the car. Ask: What does the driver have to give the attendant (money to pay for the gasoline). What can the car do now that it has gas? (move). Let all the children who make up the car move forward together. Have several other children come to the front of the room and become parts of a larger car--a truck perhaps. Follow the same procedures, and ask questions that would elicit the response that a bigger car uses more gasoline than a small one. Perhaps they will infer this idea by the number of children needed to form the larger car. When the children return to their seats, say: Let's make up a story about the gasoline station attendant. What words will we need to know? Write these words on the chalkboard as the children suggest them: station, driver, pump, gasoline, dollars. (You may add other words to this board list). Allow plenty of time for the children to look at the words.

Source: Furlong and Schmidt, C.A.R.E., 1980


GAS
OIL
OIL
OIL
OIL

Source: The Energy We Use, National Science Teachers Association, U.S. Department of Energy, 1977

Title:

How do we Use Gasoline?

Level:

Intermediate

Description:

The children will conduct a survey among faculty members in the school to determine the number of faculty members who drive to work, the size cars they have and the amount of gasoline consumed in a one week period.

Concept:

Gasoline consumption has increased. What are the reasons for this and how can energy be saved?

Activity:

The children will develop a questionnaire and will interview faculty members. Questions to be included are:

-Do you drive to and from work?
-What kind of car do you drive?
-Do you drive only yourself or do you have people who ride with you?
-How many miles away do you live?
-How many gallons of gas does it take for you to go to and from school in one week?

When the survey is complete they will compile the information to determine a.) the number of faculty, out of the total staff, who drive to work, b.) the number who drive alone vs. the numbers who car pool, c.) the kinds of cars driven, (category is by size), d.) the amount of gasoline consumed by the different kinds of cars, e.) the total number of miles driven by all staff members in a one week period, f.) the total number of gallons of gasoline consumed by the staff in a week and g.) the average staff gasoline consumption.

Their information can be charted and displayed in the following ways:

1. A graph showing the models and numbers of different automobiles driven by the faculty.
2. A graph showing the average mileage of these different automobiles (based on their computation of miles driven to school and gasoline consumed).
3. A graph showing the different ways staff members get to work: driving, bus, subway, bicycle.
4. A chart depicting the total number of miles driven by the staff and the total amount of gasoline consumed. The children might have a poster contest to see who can show this in the most interesting and imaginative way.
5. Posters and graphs can be displayed in the halls in the IMC.

Discussions should focus on several things; Could gasoline be saved by getting to work another way? Is it necessarily more economical to do so? Could gasoline be saved by car pooling? Do smaller cars really make a difference?

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

How Much Gasoline Do We Use?

Level:

Intermediate

Description:

Students will calculate the amount of oil consumed by the faculty in one week.

Concept:

Most of our energy requirements are met through fossil fuels. Transportation systems are the chief consumers of oil.

Activity:

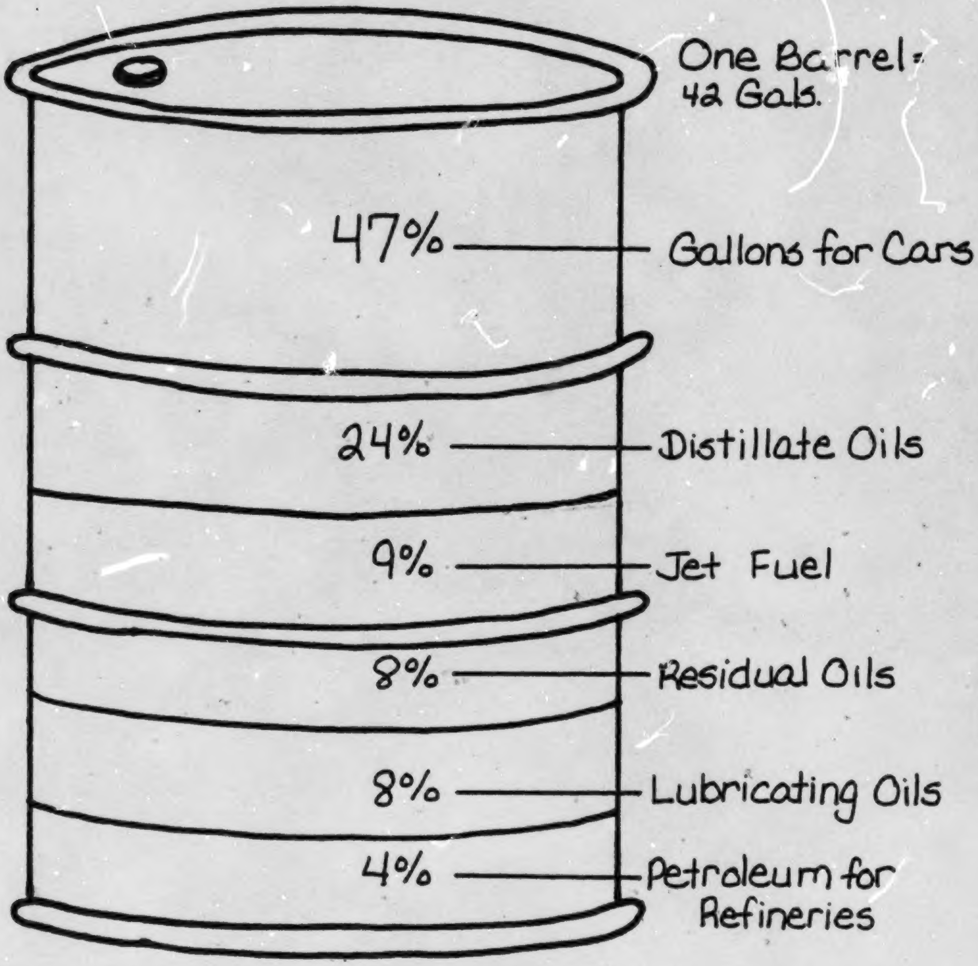
Ask the school custodian for a 42 gallon barrel or have someone make an outline of a barrel. On the barrel or outline, show the percent of oil used to make gasoline, jet fuel and other products depicted on the next page. Each student will interview the faculty and find out the amount of miles driven to work each week. Ask each car owner to estimate the miles per gallon for his/her car or use 15mpg. The students will then calculate the total number of gallons of gasoline which have been burned in one week. How many gallons of crude oil were needed to produce that amount of gasoline? Calculate how many barrels are used in a year. Discuss ways in which the consumption of gasoline might be curtailed.

Materials:

Barrel
picture of barrel

Source: Energy Activities for the Classroom - Volume II
ERIC/SHEAC, The Ohio State University, 1978

Where The Oil Goes



Title:

Choosing Your Dream Machine

Level:

Intermediate

Description:

The children will "choose" an automobile for themselves and rate it for aesthetics, economy and fuel efficiency.

Concept:

Small cars use less fuel and are more practical to operate and maintain, especially in the city.

Activity:

Ask the children to cut out a picture of the automobile they would particularly like to have for their own. They should paste it on a piece of oak tag and on the back list of all of its features; color, air conditioning, style (hatchback, station wagon, etc.), number of people it will hold, front wheel drive, gas mileage if known etc.

Ask each child what car he/she chose and why. Record the responses. Using the gas milage chart ask the children to check the mileage on the car they chose and record that next to the name of the car.

Choose two students to act as sales people. It will be their job to try to "sell" their car to the class. They should emphasize what they consider to be the best features of their car. Have the children decide which car they would buy and why.

Discuss with the children that the smaller the car and the more it will carry, the more efficient it is to operate. Have the children brainstorm a list of considerations for maintaining a car and driving in the city; fuel, regular maintenance, parking, rush hour traffic, etc.

Materials:

magazines
oak tag
scissors
rubber cement
white glue

Source: Adapted from Transportation In The City, Grade 8, 9, National Science Teachers Association, U. S. Department of Energy, 1979

YOUR DREAM MACHINE
Student Activity Sheet

Model	Manufacturer	MPG
Chevette	GM-Chevrolet	36
Civic CVCC	Honda	44
Corolla Sedan	Toyota	32
Datsun B-210	Nissan	42
Datsun 200SX	Nissan	26
Accord CVCC	Honda	42
Celica GT	Toyota	26
Rabbit	Volkswagen	34
Fiat 128	Fiat	27
VW Station Wagon	Volkswagen	28
Opel (Isuzu)	Isuzu	27
Vega	GM-Chevrolet	28
Dodge Colt	Mitsubishi	35
Pinto	Ford	30
Mazda GLC	Toyo Kogyo	38
Mustang II	Ford	26
Datsun 280Z	Nissan	21
Volvo 244	Volvo	22
Gremlin	American Motors	23
Maverick	Ford	24
Volare	Chrysler-Plymouth	20
Nova	GM-Chevrolet	22
LTD II	Ford	17
GTO	GM-Pontiac	17
Trans Am	GM-Pontiac	17
Matador	American Motors	15
Cutlass Supreme	GM-Oldsmobile	18
Cougar	Ford	16
Ford	Ford	15
Buick Electra 225	GM-Buick	18
Plymouth	Chrysler-Plymouth	15
Silver Shadow	Rolls Royce	12
Chrysler	Chrysler-Plymouth	13
Bonneville	GM-Pontiac	17
Eldorado	GM-Cadillac	14
Buick Wagon	GM-Buick	18
Ford Wagon	Ford	13
Chrysler Wagon	Chrysler-Plymouth	12
Continental Mark V	Ford	13
Toronado	GM-Oldsmobile	15
Grand Prix	GM-Pontiac	17
Thunderbird	Ford	17
Mercedes 280 SE	Dailler-Benz	16
Seville	GM-Cadillac	16
Chevy Van V-8	GM-Chevrolet	18
Dodge Van V-8	Chrysler-Dodge	16
Ford Van V-8	Ford	16
VW Bus	Volkswagen	23

*January 1977 Gas Mileage from EPA City/Highway Test Cycle. Source: "1977 Gas Mileage Guide for New Car Buyers," U.S. Environmental Protection Agency, January 1977 (Second Edition) Fuel Economy, Pueblo, Colorado 81009 -- Single Copies; Fuel Economy, FEA, DPM Room 6500, Washington, D.C. 20461 -- Bulk Copies.

Source: Energy Activities, U. S. Department of Energy, 1979

Title:

Gas Pump Game

Level:

Intermediate

Description:

This activity gives practice in computation using the cost of gasoline as the item to be computed.

Concept:

Refering to the previous lesson on "Choosing Your Dream Machine" the point can be made that the fewer miles per gallon an automobile gets the more money it costs to operate.

Activity:

Refer to next page.

Source: Community Workers, National Science Teachers Association,
U. S. Department of Energy, 1977

GAS GAME BOARD

GAS

HOW MANY GALLONS?

ONE GALLON COSTS

YOU PAY

$			

Source: Energy Activities, National Science Teachers Association,
U.S. Department of Energy, 1977

10a b

GAS PUMP GAME

Materials Gas game board
Dice
Scorecards
Chart for students needing math help

Players 2-6. Each team has a game board. Each player has a scorecard.

Directions Each player rolls a pair of dice. The one with the highest number goes first. First player rolls dice and writes number of the dice shown on his scorecard under "How many gallons?" He then computes the cost of the gas and writes it on his scorecard under "cost." Next player does the same. Each player gets 10 turns. Each player finds the total cost. If having a "winner" seems necessary, you might have the one with the lowest number declared the winner. There is no real point to be made of winners and losers.

Note: Students who need help with addition may use the chart with costs written on it.

Scorecard

Name ____________________

How many gallons?	Cost: $1.25 per gallon
1. ________	____________
2. ________	____________
3. ________	____________
4. ________	____________
5. ________	____________
6. ________	____________
7. ________	____________
8. ________	____________
9. ________	____________
10. ________	____________

To vary, change the cost of the gas.

Chart

How many gallons?	Cost
1	.60
2	1.20
3	1.80
4	2.40
5	3.00
6	3.60
7	4.20
8	4.80
9	5.40
10	6.00
11	6.60
12	7.20

Title:

Traffic Survey

Level:

Primary and Intermediate

Description:

Students will observe the kinds of vehicles which pass by the school during a specific time.

Concept:

Gasoline, the primary product refined from crude oil, is the major source of energy in the transportation system. Conserving gasoline, would save larger quantities of oil.

Activity:

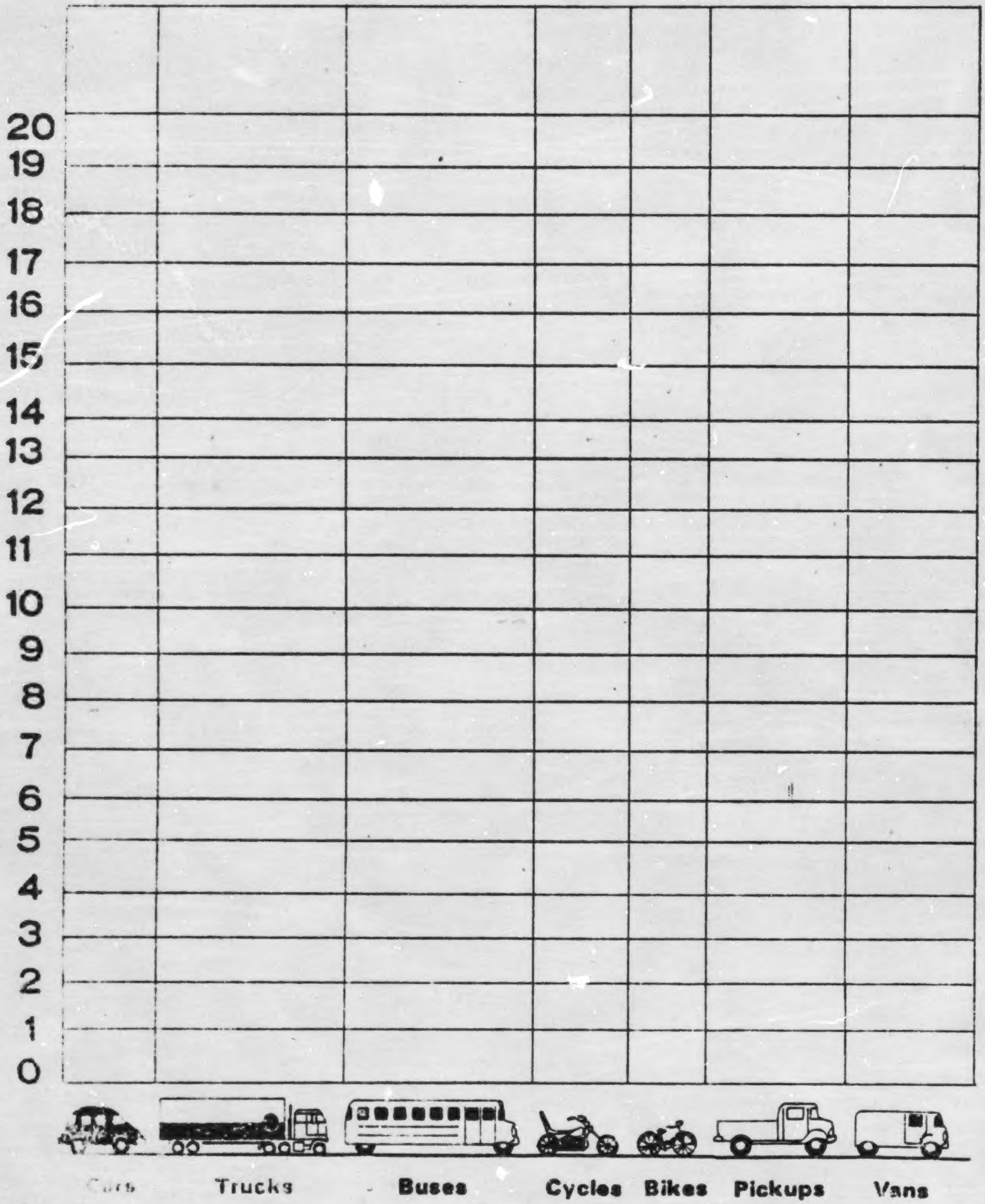
Select a location in front of the school or in a window of the classroom where traffic can be observed. Choose two to three 15 minute periods during one day and make a tally of the number and kinds of vehicles observed. Students may use either of the tally sheets on the next two pages. Classify the kinds of vehicles according to their use - private and business. Make individual graphs showing the number of vehicles observed during the time. Discuss ways in which vehicles might conserve gas: car pooling, riding smaller cars, taking public transportation.

Materials:

tally sheets
pencils
graph paper
rulers

Source: Energy and Transportation, National Science Teachers Association
U. S. Department of Energy, 1979

TRAFFIC SURVEY COUNT



TRAFFIC SURVEY

	Time ______				Time ______				Time ______			
	Cars	Trucks	Buses	Motor-cycles	Cars	Trucks	Buses	Motor-cycles	Cars	Trucks	Buses	Motor-cycles
Day #1												
Day #2												
Day #3												
Day #4												
Day #5												

Each time you see a car that has only one person in it, put a check(√) below.

Title:

Mr. Hernandez Goes to Work

Level:

Primary

Description:

The children will discuss the different methods of transportation and will determine the least expensive and most efficient ways for Mr. Hernandez to go to work.

Concept:

Public transportation is frequently the best way to travel because of cost and time.

Activity:

Ask the children to brainstorm a list of all the ways people can travel, not only to and from work, but around the city. Record their answers.

Show them the map of Mr. Hernandez's choices for going to work and discuss it with them. Write the cost on the board (using the chart) of each method and ask them to decide which they think is best and trace the route with their pencil.

Then ask each child what he/she decided and tabulate the results.

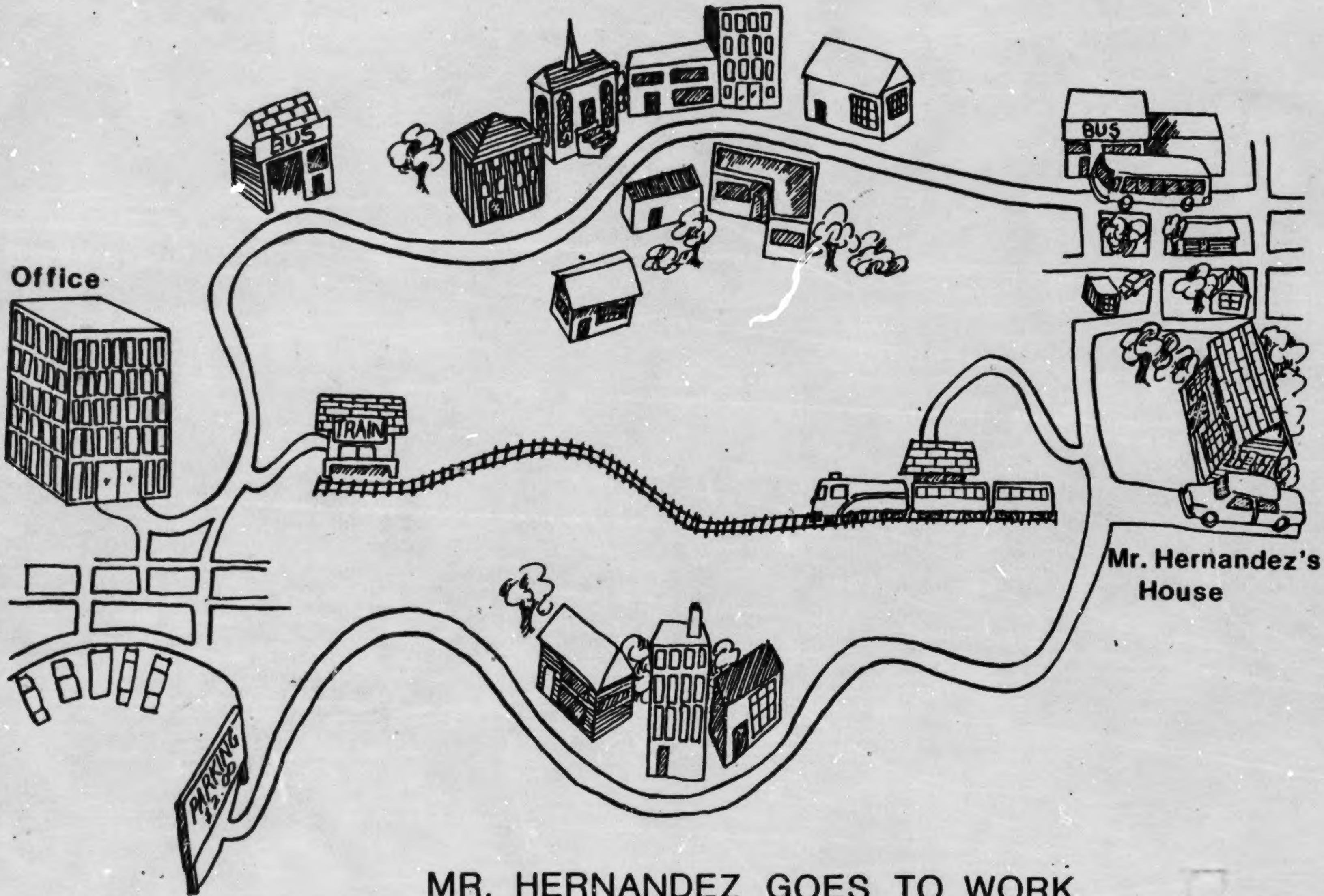
Divide the children into groups; one group each for train, bus, automobile, van, motorcycle, bicycle, wagon, and roller skates. The children must pantomime their method of transportation so that the rest of the group has to guess what they are. They should then put on a short skit trying to point out their advantages as a viable means of transportation.

After they have finished make a group chart showing the advantages for all. Include things such as gas mileage, time expended, distance that can be travelled, numbers of people serviced by each etc.

Materials:

map

Source: Adapted from Energy and Transportation, National Science Teachers Association, U. S. Department of Energy, 1977


BUS
BUS
Office
TRAIN
Mr. Hernandez's
House
PARKING
$2.00

MR. HERNANDEZ GOES TO WORK

Source: Energy Activities. U. S. Department of Energy, 1979

Title:

Mr. Hernandez Goes to Work (alternate transportation methods)

Level:

Intermediate

Description:

The children will assess Mr. Hernandez's choices for means of transportation and will decide what is the most efficient way for him to travel.

Concept:

Although an automobile may sometimes seem the easiest way to travel, it is not always the most efficient or the least expensive.

Activity:

Distribute copies of Mr. Hernandez Goes to Work and the chart Cost of Getting to Work.

"Find Mr. Hernandez's house. Suppose he just moved into this house and he is trying to decide how to go to work. Find Mr. Hernandez's office. Mr. Hernandez has three choices. He can drive his car, take a bus or take a train. Look at the chart called Cost of Getting to Work and compare the amount of money and time it takes for each kind of transportation. (for younger children you may want to go through the chart with them.) When you decide what you think is the best route, trace the route with a pencil.

Have one student read what is on the chart and discuss all terms used, i.e. "other costs" under car refer to insurance repairs, replacement etc. If necessary, work with small groups who need help with the assignment, while others complete it independently. Write "car," "train," "bus" on the board at the end of the allotted time. Ask children how many thought Mr. Hernandez should go by car, bus or train and write the numbers on the board.

Call on three students and have each go to the board and work the problem related to the total cost of using the car, bus and train.

Allow time for the students to discuss their choices. Ask them which type of transportation costs less, public or private? Which do they think most people use?

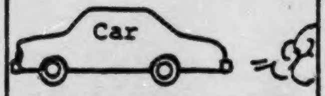
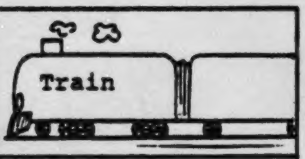
Distribute the student questionnaire, "How People Get to Work," and read the three questions. Give the class the assignment of asking any two adults. Tell them to bring the information to class the next day.

Materials:

Mr. Hernandez Goes to Work
Chart - Cost of Getting to Work

Source: Energy and Transportation, National Science Teachers Association
U. S. Department of Energy, 1977

Cost of Getting to Work

Types of Transportation			
Costs	One Way Gasoline $ .70 Parking 2.00 Other Costs .60 Total $	One Way Fare $ .60 Total $	One Way Fare $1.30 Total $
Time	25 minutes	35 minutes	20 minutes

Work the problems below:

1. How much does Mr. Hernandez have to pay each day to go to work and return by car?

2. How much would it cost if he went by bus?

3. How much would it cost if he went by train?

4. How much time does it take?

   By car? _____ minutes

   By bus? _____ minutes

   By train? _____ minutes

5. Which transportation method do you think Mr. Hernandez should use? Why?

Source: Energy Activities, U. S. Department of Energy, 1979

Title:

Cost of Getting to Work

Level:

Intermediate

Description:

The children will use the results from their questionnaire to determine the number of people who use cars over public transportation and the cost of doing so.

Concept:

It is more efficient and less expensive to use public transportation and the cost of doing so.

Activity:

Using the questionnaire ask the students how many people travelled to work by car, bus, train, on foot or bicycle. Record the totals. "Now look at the number of miles each person travelled. How many travelled one mile or less by car? How much did it cost?" Enter this on the chart and continue until all the information is categorized.

Ask the following questions; What kind of transportation is used by most people? How many miles do most people travel? What do most people spend to go to work? Which type is most expensive? Least Expensive? Which would save energy? Which do you think is the best way for people to go to work? How could the cost of driving cars be reduced? If Mr. Hernandez spent $4.00 per day to drive his car to work and he shared expenses with one other person what will each pay? If three people ride with him what will each pay?

Now have the students conduct the traffic survey.

Materials:

Questionnaire - See Activity - Page 101

Source: Energy and Transportation, National Science Teachers Association,
U. S. Department of Energy, 1977

Title:

Give a Hoot. Don't Pollute

Level:

Intermediate

Description:

Students complete a crossword puzzle using pollution words.

Concept:

Pollution comes in many forms: harmful substances in air and water as well as noise and unsightliness.

Activity:

It might be best to go over each of the statements listed under across as a class. Brainstorm possible responses and list them on the chalkboard. Then ask children to select the response that they think is the best one for their individual puzzles. See who can "solve" the mystery word first. Declare him/her the winner.

Materials:

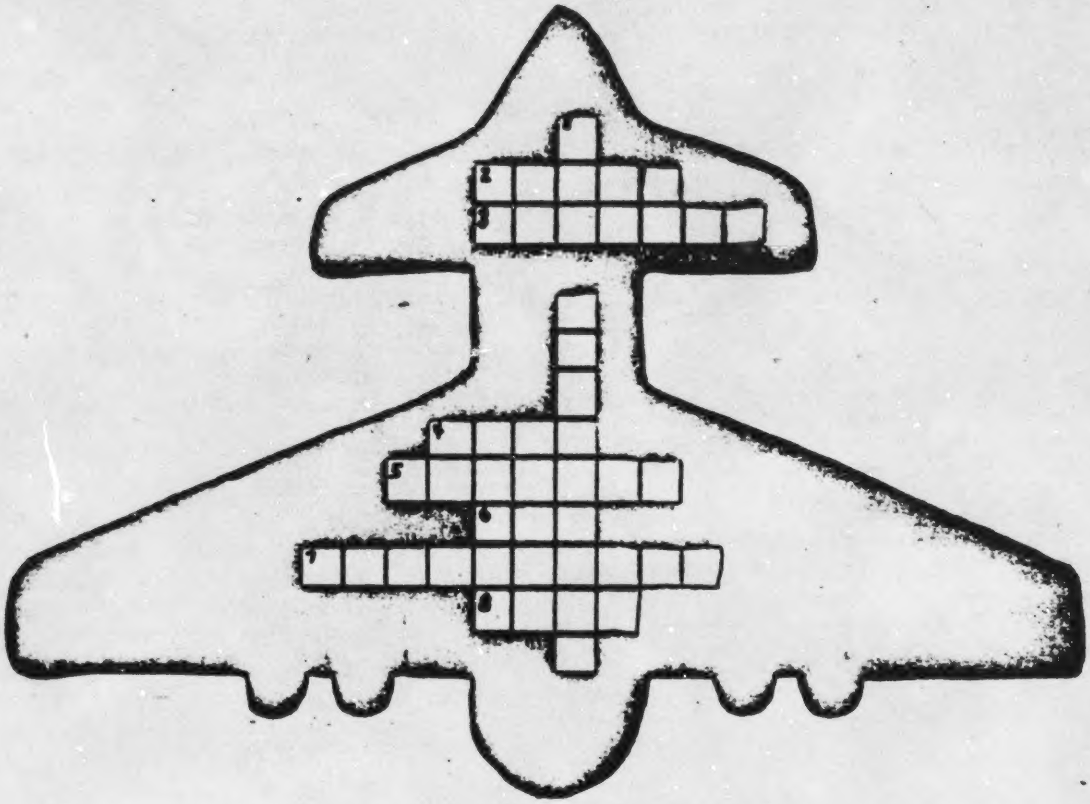
pencils
crossword puzzles

Source: Energy and Transportation, Grade 3, National Science Teachers Association, U. S. Department of Energy, 1977

Give a Hoot. Don't Pollute!

LEARNING NEW WORDS ABOUT AIR POLLUTION

Find and write the missing letters in the airplane puzzle. Write the mystery word in the blanks below the puzzle.



Across

2. Loud sound
3. Place for airplanes to land and take off.
4. What is burned in an airplane engine?
5. Engine part where smelly fumes come from.
6. Kind of engine used in many planes.
7. Name for back and forth movements.
8. Air that has a lot of smoke and fog in it.

Down

1. Mystery word

Source: Energy and Transportation, National Science Teacher Assoc., U.S. Dept. Energy, 1979

Title:

A Look Into the Future

Level:

Primary and Intermediate

Description:

Students will design transportation vehicles of the future fueled by renewable energy sources.

Concept:

Public transportation is the most efficient way to move large masses of people. Public transportation vehicles fueled by renewable sources of energy, sun, wind, water, conserve non-renewable energy sources.

Activity:

Begin with a discussion of the kinds of vehicles which are used in public transportation. How are these vehicles fueled? (gasoline and electricity) Suppose you wanted to move many people in vehicles powered by sun, wind, and water, how would the vehicles look? Discuss the advantages and disadvantages of using these sources to fuel vehicles. Ask students to design vehicles of the future. You may want to list criteria to consider when designing the vehicles: comfort, safety, ease of access, provisions for handicapped persons, provisions for children's entertainment - T.V., music, refreshments.

Display the drawings on a bulletin board or make a large picture book with a brief description of each design.

Materials:

paper
crayons

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Energy Cartoons

Level:

Intermediate

Description:

Students will be asked to collect or trace cartoons that relate to energy.

Concept:

Energy conservation has environmental, political, social and economic consequences.

Activity:

There are several syndicated columnists, Herblock and Maulden, who produce effective cartoons about what the government is doing and not doing about energy. Students can assemble a booklet or bulletin board of these cartoons and then analyze the pictures in terms of the feelings that are being depicted and whether they agree or disagree with the message.

Materials:

Newspaper
scissors
drawing paper

Source: Energy Activities for the Classroom, Vol. II, ERIC, Ohio State University, 1978

4.

HEATING AND COOLING

PRE-ASSESSMENT:

What Do You Know About Energy? Heating and Cooling

It is a hot day in summer. In order to keep cool would you...

...Turn on the air conditioner?
...Wet a white shirt and shorts and sit in the shade?
...Sit in front of a fan?
...Turn on a fire hydrant?
...Other?

To keep our homes a comfortable temperature...

...Seal cracks under windows and doors?
...Keep the thermostat as low as possible in the winter?
...Let the sun shine in your house on a hot day?
...Keep your windows open in the winter?
...Inside the house, wear several light layers of clothes in the winter?
...Keep the shades down and curtains down on a hot day?
...Sunshine helps to keep your house warm in the winter?
...To stay cool in the summer wear dark colored clothing?
...To stay warm in the winter wear several layers of clothing?
...An electric fan is cheaper than an air conditioner?

Yes or No...

...Dark colors absorb heat?
...Plastic around the windows helps save heat?
...You can save money by turning down your thermostat?
...An ice cube melts faster on black paper than white paper?
...Energy changes into heat and light?
...White colors reflect heat?
...Sun provides us with heat and light?
...Insulation conserves energy?
...Cracks let warm air out and cold air in?
...Awnings keep a house cool?

Title:

Heat and Light

Level:

Primary

Description:

Identify objects which emit heat and light.

Concept:

Energy is converted into heat and light.

Activity:

Light a candle and place in a glass. Ask children to observe what is happening. The energy in the wax, a petroleum product, is converted into light. Ask children to carefully touch the glass and identify another form of energy conversion, light. Some objects produce heat and light or one of the other. List as many objects as you can think of which produce heat and objects which produce light. Select objects in the home and the school. Students may cut out pictures or draw pictures of these objects. Distribute a copy of the sheet on the next page as a follow-up activity.

Materials:

candle
glass
matches
activity sheet
crayons
magazines (optional)
paste (optional)
scissors (optional)

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Sunlight Makes Things Warm

Level:

Primary and Intermediate

Description:

A container of water placed in the sun and another placed in the shade will be measured for temperature changes.

Concept:

The sun is a source of energy which provides heat and light for our daily lives. Proper use of the sun can reduce energy costs in the home.

Activity:

Divide the students into groups and give each group two identical bottles or pans of water and two thermometers. Since some of the students may not be able to read a thermometer, use a grease pencil to mark the initial and final readings. Interpretation can be made upon a change and in the mercury colum. Students will put one container in the sunlight and another, with the same quantity of water, in the shade. Initial temperature readings should be made. After one hour, check the containers and make a final reading. Discuss what has happened. Has there been a change in temperature and why? Has the temperature increased, decreased or stayed the same? Did sunlight effect the water temperature? How can sunlight help to heat our homes? What can be done in the summer to keep our homes cool?

Materials:

identical bottles or pans-two per group
thermometers-two per group
water

Source: Energy Activities for the Classroom, ERIC, Ohio State University, 1978

Title:

Now You See It, Now You Don't

Level:

Primary and Intermediate

Description:

The children will observe ice cubes melting in the sun.

Concept:

The sun is an energy source which causes an ice cube to melt and change form. Eventually the water will absorb the heat and turn warm.

Activity:

Place several ice cubes in a dish and set them on the windowsill in the sun. Ask the children what they think will happen and record their hypothesis on chart paper. Observe the ice cubes every ten minutes until they have melted.

Ask the children what happened to the ice? Why? What do they think will happen to the water the longer it is left in the sun and why?

Discuss with them that the sun is an energy source that causes something cold, the ice, to get so warm it melts. As more heat is absorbed by the water it gets even warmer. Point out that in the winter we try hard to keep heat inside our houses and in the summer we try to keep heat out. If a dish is left in direct sunlight for 2 - 2-1/2 hours, the temperature of the water will equal the temperature of the window sill. This demonstrates the concept of equallibrium and energy storage by materials. To demonstrate how some materials transmit energy and others store it, allow a ball of aluminum foil and water to heat in the sun. Remove both from the sun and discuss what happens. The aluminum heats quicker and reaches the same temperature as the water. However, aluminum cools quicker than the water.

Materials:

ice
dish
chart paper

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Preserving An Ice Cube

Level:

Primary and Intermediate

Description:

Students will participate in a problem-solving activity to determine how to keep an ice cube from melting.

Concept:

Insulation materials which prevent heat loss are the easiest and most efficient means of conserving home energy.

Activity:

Divide students into groups and explain that the challenge is to make a container which prevents the ice cube from melting quickly. Provide a selection of materials for students to choose from; small boxes, empty milk cartons, newspaper, juice cans, cotton, fabrics. When the containers are finished, fill with ice cubes, place in the room and record the time. Observe containers every 20 minutes. The group which designs the container in which the ice cube melts last, wins. Determine what materials were most effective in preventing the ice cubes from melting quickly and why? Could these materials also be used in the home and why? Look at the simplicity of design. Several inches of fabric surrounding the container may insulate it but one inch of styrofoam may do a better job. This demonstrates efficiency vs. effectiveness in energy conservation.

Materials:

activity sheet
newspaper
fabrics
cotton
empty milk cartons
boxes
scissors
tape
glue

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council,
Des Moines, Kowa, 1979

Title:

Keeping Warm

Level:

Primary and Intermediate

Description:

Students will hold ice cubes with different fabric gloves.

Concept:

Fabric insulates against the cold by retaining body heat.

Activity:

Select gloves made from different fabrics, wool, cotton (use a sandwich bag as a liner), leather, vinyl, rubber and disposable plastic. Divide students into groups and ask them to experiment holding an ice cube with an ungloved hand and a gloved hand. Ask students to hypothesize which fabric will keep the hand warm the longest. Rank materials according to warmth with warmest first. Begin by holding the ice cube in the bare hand for three minutes (use an egg timer) observe the cube and describe the cold. Hold the ice cube wearing the different gloves. Observe the ice cube each time after 3 minutes and describe any feelings of cold. Ask groups to compare their rankings of different materials to determine a consensus. Which material is the warmest and why? Which is the least warm? What clothing materials would they recommend for winter wear and why? List on a chart and use as part of bulletin board display.

Materials:

ice cubes
wool
cotton
leather
vinyl
rubber and disposable plastic gloves

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Color Affects Heat

Level:

Primary and Intermediate

Description:

Two identical containers of water, one painted black and one unpainted,are placed in the sun and removed from the sun.

Concept:

Black objects absorb and retain heat. Understanding how color effects heating and cooling can help to save energy costs.

Activity:

Divide students into groups and give each group two identical jars or juice cans of water. Also give students a container of water soluble black paint with which to paint one jar. As in the previous experiment, fill the jars with identical amounts of water, measure the temperature and place in the direct sunlight. Check containers after an hour to see if there is a difference in temperature between the two containers. Allow more time if necessary. Remove both containers from sun, after recording the water temperature in both, and place in the shade. Check the temperature after an hour. What were the differences in temperature between the painted and unpainted containers in the sun and in the shade. How did the black paint affect the temperature of the water? What does this tell you about black paint? Which would you want to use in the summer; or in the winter? Using the same jars, place one so that its top (painted black) is aimed at the sun. Place the second jar upright. The water in which jar heats faster? This demonstrates that metal transfers heat faster than glass. Or, place two jars in the sun, one empty and one filled with water. Which jar warms faster and which stays warm longer? This experiment demonstrates that gasses (air) transmit heat poorly and therefore are good insulators.

Materials:

identical glass containers or juice cans
thermometers
water
black water soluable paint

Source: Adapted from: Energy Activities for the Classroom, ERIC Center for Science, Ohio State University, 1978

Title:

Black and White Together (Reflection and Absorption)

Level:

Primary and Intermediate

Description:

The children will observe ice cubes melting on black paper and on white paper to determine which melts first.

Concept:

Light colors reflect heat, dark colors absorb heat.

Activity:

Divide the class into a few small groups. Give each group a white trash bag and a black trash bag. Explain to the children that you will place an ice cube on each piece of bags and the bags will be placed in the sun. (Make sure that the bags are placed on a piece of wood or a book to avoid heating the cubes from underneath). Ask them what they think will happen. Have each group record their hypothesis. Give them other ice cubes and ask them to observe the change. They should record the change either by drawing a picture or describing it in words.

After the ice cubes have melted ask each group which melted first and record their answers. The ice cubes on the black bag should have melted first. Explain that light colors reflect the heat and light and dark colors absorb it. The black bag keeps or retains the heat from the sun and that heat makes the ice cube melt faster.

Ask the children if they can explain what kinds and colors of clothes people wear in the summer and in the winter and why.

Materials:

black trash bags
white trash bags
ice cubes

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

What Keeps Us Warm, What Keeps Us Cool?

Level:

Primary

Description:

The children will find pictures of items that keep them warm or keep them cool. They will cut them out and classify them in different ways.

Concept:

There are different ways of keeping warm or staying cool. Some depend on direct energy use and some do not.

Activity:

The children will use magazines to cut out pictures of items that keep them warm and items that help them to stay cool. They should be encouraged to find as many different things as they can and be able to justify their choices. Certain types of clothing for example might be chosen for color and fabric (dark colored wool to keep warm, light colored cotton to stay cool) and the children should know why they chose them.

First, ask the children to classify their pictures according to initial consonant sounds. They can either record their lists individually or it can become a large group activity.

Second, ask the children to classify their pictures according to things that require direct energy sources, such as fans, air conditioners, etc. and things that do not, clothing, blankets, storm windows, etc.

Third, ask the children to classify those items that require direct energy sources according to the type of energy it requires; electricity, coal, gas, oil, wind, water, sun, etc.

Fourth, ask the children to look at the pictures of things that do not require direct energy sources and ask them if they think energy was used to produce these things. Discuss with them the kinds of energy required to manufacture clothing, blankets and sheets, windows, doors and other building materials.

Fifth, ask the children to classify any items that occur naturally and require no extra energy source - trees for shade for example, or wood for fire.

As a final activity have the children make a collage of items that keep us warm and things that help us stay cool.

Materials:

magazines
scissors
glue
oak tag or posterboard

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Plugging Holes Saves Energy

Level:

Primary

Description:

An experiment which demonstrates how stopping up holes in a container conserves the contents.

Concept:

Much household energy is wasted in the form of heat escaping through cracks in houses. This wasted energy also wastes money.

Activity:

Pierce several holes in a milk jug with an ice pick. Ask children if the jug will hold water. Demonstrate by pouring water into the jug while it is held over a bucket. Why did the water leak out of the bottle? Ask children if something can be done to the jug to retain water. How can the holes be plugged? Use plasticine to stop up holes and then pour water into the jug again. Why did the water not leak out this time? Suppose the milk jug were a house and the water was cold air, how could you stop air from coming into your house? Where are the holes in your house? (Under doors, around windows) Why is it important to eliminate cracks during cold weather to keep the house warm? Discuss how heat costs money and when cold air comes in and heat gets drawn out, it wastes heating money.

Materials:

empty plastic milk jug
bucket
ice pick
water

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Stuff Those Cracks!

Level:

Intermediate

Description:

Students will construct "cracks" from heavy cardboard and attempt to "stuff" them with different materials to determine which materials are most effective.

Concept:

A major source of heat loss in the home is due to heat escaping through cracks and by cold air coming in through the cracks. This wasted heat is not only lost energy but also wasted money.

Activity:

Each student constructs a crack by cutting two, 2-1/2 X 6 inch strips from heavy cardboard. In addition, s/he will also cut two strips 5-1/2 inches long x 2 inches wide as reinforcement. Lay the two long strips, side by side, leaving a 1/2" space between. Take the reinforcement strips and lay them across the top and bottom of the vertical strips. Staple the reinforcers to the long strips, leaving 1/2" gap between the longer strips. Ask children how many ways they can "stuff" the gap so that wind cannot come through. Use a fan to test the different "stuffing" methods. Consider using newspaper, cotton, material, clay. What kinds of materials can be used to stuff around doors and windows in your home. Why is it important to do so?

Materials:

2 - 2-1/2 X 6 inch cardboard strips
2 - 5-1/2 X 2 inch cardboard strips
scissors
stapler
newspaper
materials
clay
cotton

Source: Furlong and Schmidt, C.A.R.E.

Title:

How Do Storm windows work?

Level:

Primary and Intermediate

Description:

Three groups of children construct these different kinds of "houses" to determine which house will stay warmer longer.

Concept:

Storm windows help to retain heat and thus conserve household energy.

Activity:

Divide the class into three groups and give each group a cardboard box. Ask each group to cut a large "window" on each side of the box. The students may also decorate the houses to make them distinctive. One house remains with the windows cut out, a second house has plastic taped on the windows inside of the box and the third has plastic windows and a large piece of plastic pulled tightly over it and taped on the bottom. Place each box in the sun and put a glass of water inside each box. Ask students to hypothesize which box will heat up sooner and why. Check the temperature of the water in each container before placing it in the sun. Check the temperature again after an hour. Which container of water is warmest and why? What do you think would happen if we put the boxes in the refrigerator? Why do two pieces of plastic keep the water cooler than one piece or no pieces? (air space acts as insulation) Discuss what can be done in our homes to keep our houses warm in the winter and cool in the summer.

Materials:

3 large cardboard boxes
scissors
paint (optional)
plastic
tape
3 glasses
water

Source: Energy Conservation Activity Packet, Iowa Energy Policy Council, Des Moines, Iowa, 1979

Title:

Make Your Own Draftometer

Level:

Primary and Intermediate

Description:

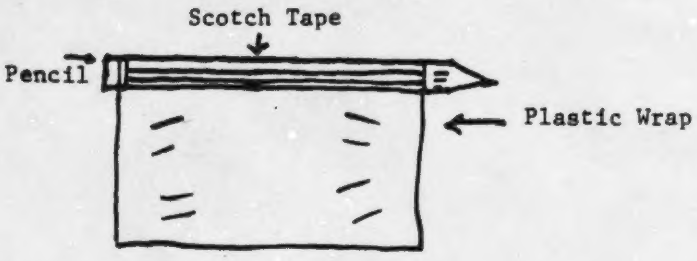
The children will construct a draftometer and later will test their homes for air leaks.

Concept:

A great deal of energy is lost by warm air escaping because of drafts and cracks. A draftometer demonstrates how air moves through even the smallest of spaces.

Activity:

Cut a strip of plastic food wrap 25 CM X 12 CM. Scotch tape the food wrap to the pencil to hold it in place. Blow on the plastic gently to assure that it responds to air movement.



Note: Force air furnace must be off to use draftometer. First, test the classroom and around the school for leakage by holding draftometer near the doors and windows. If the plastic moves there is a draft. Explain that the warm air will be pushed upward and out by the cold air that comes in.

Materials:

pencil
plastic wrap
scotch tape

Source: Energy Activities for the Classroom, Vol. II, ERIC/SMEAC, Ohio State University, Columbus, Ohio, 1978

Title:

Home Audit

Level:

Primary and Intermediate

Description:

The children with their parents, will survey their homes for drafts, cracks, and insulation. They will bring the results to school.

Concept:

A good deal of energy is lost because of leaking air. Energy, and money, can be saved if cracks and drafts are sealed.

Activity:

Using the draftometers and the Home Audit Checklist on the following page the children and their parents will survey their homes for drafts, cracks and places where there is already insulation or where insulation is needed. They will check off each area and bring the results to school.

Materials:

draftometer
home audit survey sheet "Is There A Draft?"

Source: Furlong and Schmidt, C.A.R.E., 1980

IS THERE A DRAFT?

	Windows	Doors	Walls	Insulation Needed Yes	Insulation Needed No
Bathroom					
Kitchen					
Living Room					
Dining Room					
Bedroom					
Bedroom					
Bedroom					
Other					

Title:

Take the Heat Off.

Level:

Intermediate

Description:

The children will determine how much money can be saved (based on 3% reduction in heating requirements for each degree thermostat setting is changed) if thermostat is lowered a certain number of degrees.

Concept:

By lowering the thermostat setting you reduce the amount of energy required to heat our home and consequently save money. This activity also gives practice in doing percentages.

Activity:

Explain to the class that for each degree a thermostat is lowered it can save 3% of the heating requirements and, therefore, 3% of the cost of fuel. Reducing the thermostat from 70 degrees to 69 degrees will save 3%,from 70 degrees to 68 degrees 6% and so on.

Ask each child to try and find out the cost of heating the home during the past heating season and find out if the present thermostat setting differs from the previous year.

When the children return with the information ask them to figure out how much money they could save if the thermostat were reduced by 2 or 3 degrees. By reducing the thermostat at night, when they are under covers, and raising the temperature in the morning, energy will be conserved. Reducing the temperature when no one is home saves money but does not affect comfort.

Discuss with the class whether they could be comfortable with the thermostat lower than it is now and what they would do to help keep warm.

Source: Energy Activities for the Classroom, ERIC, Ohio State University, Columbus, Ohio, 1979

Title:

How Hot is Hot? How Cold is Cold?

Level:

Intermediate

Description:

The children will calculate the Degree Days for a one month period to determine the number of days in a month when it is necessary to turn on the heat or provide extra cooling (depending on the month selected).

Concept:

There may be ways of keeping heat or air conditioning off, or lower, by wearing certain kinds of clothing for example. By calculating average temperatures for a particular period it's possible to see how many days you could possibly conserve energy.

Activity:

Choose a month when there is a variation in temperature, such as October or April on the east coast. Record the high temperature and the low temperature for each day and average the two.

A Degree Day (DD) is defined as the difference between 65 degrees F and the average of the daily high and low temperatures. If the average is below 65 degrees F it is a heating condition (HDD) and if the average is above 65 degrees it is a cooling condition (CDD).

Record the data on a chart such as this:

MONTH

Date	High	Low	Average	HDD (65 average)
1	63	42	51	14
2	72	50	61	4
3	69	48	58	7
4				
5				
6				

If, for example, on the second and third of the month, there was a 4 and 7 degree difference between a heating condition (HDD) day temperature it is possible to consider ways of getting along without turning on the heat. By keeping a record for the month you can determine: a) how many Heating Condition days there were, b) How many days one might possible do without heat, and c) Whether or not there are any patterns to indicate the need for heat. It might be that the house would still require heat.

Source: Adapted from Energy Activities for the Classroom, Vol. II, ERIC, Ohio State University, Columbus, Ohio, 1978

Title:

Hot and Cold

Level:

Primary

Description:

Students will brainstorm hot and cold words, use them in experience stories, write similies and metaphors, and/or draw pictures which describe words.

Concept:

The purpose of this activity is to stimulate vocabulary development.

Activity:

Begin the activity by brainstorming as many words as possible which relate to "hot" and "cold". Here are some suggestions for activities which may follow:

1. Divide into teams and take turns acting out the words for others to guess.
2. Select a "hot" and a "cold" word and illustrate each. Display pictures in a class booklet.
3. Compose a class experience story using the hot and/or cold words. Make a mural of the story by tearing colored construction paper into shapes which represent the story. Paste on a large sheet of mural paper or shelf paper and display.
4. Select words from hot and cold list and develop incomplete sentence stems such as; Hot is like...., Cold is like.... Arrange together in a class poem which can be tape recorded by the students.

Materials:

construction paper
scissors
glue
mural paper
crayons
drawing paper

Source: Furlong and Schmidt, C.A.R.E., 1980

Title:

Hot and Cold

Level:

Intermediate

Description:

Students will brainstorm hot and cold words, use them to form similies and metaphors and write poetry using the words.

Concept:

The purpose of this activity is to stimulate vocabulary development.

Activity:

Begin the activity by brainstorming synonyms and words associated with "hot and cold". Here are suggestions for activities:

1. Develop open ended incomplete sentence stems; Hot is like.... cold is like... Ask students to select similies to use in a Haiku or Cinquain.
2. Introduce the concept of metaphor, develop metaphors from words listed during brainstorming session and use in Haiku or Cinquain.
3. Select a simili or metaphor and design a poster using the word and the simili/metaphor as the image.
4. Write a class Cinquain. (see next page)

Materials:

paper
pencil
poster board
paint/crayons

Source: Furlong and Schmidt, C.A.R.E., 1980

The Cinquain

Its name comes from the French word CINQ which means five. It is an unrhymed five line poem with the following pattern for syllables: first line - 2 syllables: second line - 4 syllables; third line - 6 syllables; fourth line - 8 syllables, fifth line - 2 syllables. A simpler variation is as follows:

Line --	One word, which may be the title.
Line 2-	Two words, describing the title.
Line 3-	Three words, describing an action.
Line 4-	Four words, describing a feeling.
Line 5-	One word, referring to title.

Haiku

Haiku is a popular form of poetic expression in Japan. It expresses atmosphere, mood or both. It is frequently an unfinished statement. Often the last line of a verse offers a surprise element or a sense of the unexpected. It is a delicate verse form, usually about nature. There are 17 syllables in Haiku. The first line has 5 syllables, the 2nd line 7 syllables, the 3rd line 5 syllables.
Example:

Summer

Sitting on the beach
Watching other children play
Waiting for a friend.

Tanka

Tanka is an oriental verse form built upon the Haiku pattern of 5-7-5 syllable lines. It differs because it has two seven syllable lines added to the Haiku pattern, making 31 syllables in all: first line - 5 syllables, second line - 7 syllables, third line - 5 syllables, fourth line - 7 syllables, fifth line - 7 syllables.

The dew is pressing - 5
The dainty rose soft petals - 7
Tenderly coaxing - 5
Spring to open up her eyes - 7
And share her beauty - 5

Title:

Seek and Find

Level:

Prinary and Intermediate

Description:

The children will review energy related terms by finding the words on the Seek and Find. The first is for primary children, the second for intermediate.

Concept:

This is a vocabulary review.

Activity:

The children must circle all the words they can find. All the words are related to the activities in the preceding units. The words can be found horizontally, vertically or diagonnally.

Materials:

reproduce Seek and Find puzzles.

Source: Furlong and Schmidt, C.A.R.E., 1980

SEEK and FIND

D	Z	T	A	D	L	P	E	T	R	O	L	E	U	M
R	B	X	N	G	T	R	O	Z	M	E	T	E	R	I
A	J	F	A	R	E	N	E	R	G	Y	J	J	R	A
F	O	S	S	I	L	R	D	O	N	T	P	A	B	P
T	F	W	T	J	F	U	B	O	C	A	O	R	P	P
O	H	S	G	P	H	A	I	R	J	S	L	S	D	L
M	L	C	K	C	P	T	L	W	S	F	L	H	G	I
E	R	K	J	S	A	R	A	T	E	F	U	E	L	A
T	H	S	O	L	A	R	P	B	W	P	T	I	M	N
E	M	T	U	F	X	K	L	U	Y	O	E	B	P	C
R	T	S	V	K	I	L	O	W	A	T	T	G	R	E
J	N	Z	C	O	N	S	E	R	V	A	T	I	O	N
I	H	M	B	W	T	H	E	R	M	O	S	T	A	T

How many of these words can you find? Circle them.

1. draftometer
2. fossil
3. solar
4. insulation
5. conservation
6. thermostat
7. fuel
8. petroleum
9. meter
10. don't pollute
11. appliance
12. energy
13. kilowatt
14. air

Source: Energy Archives, U. S. Department of Energy, 1977

SEEK and FIND

D	A	T	F	P	H	E	N	E	R	G	Y	A	H
R	P	G	A	S	J	S	R	H	S	G	F	R	J
A	R	J	F	R	T	O	S	M	T	B	O	Z	C
F	X	J	K	O	C	N	V	L	I	E	S	R	A
T	Z	H	E	A	T	D	F	E	J	L	S	N	R
P	W	A	I	M	R	Z	B	O	N	C	I	C	O
F	U	E	L	E	P	D	K	H	S	G	L	J	R
M	F	P	T	R	H	R	E	K	M	R	S	D	F
D	B	A	S	M	B	L	C	J	C	A	F	U	W
C	W	B	N	O	P	A	I	L	I	G	H	T	N
D	R	O	K	T	R	B	L	W	I	N	D	O	T
J	T	Z	R	C	X	Z	J	D	H	L	M	S	A

How many of these words can you find? Circle them.

1. draft
2. heat
3. gas
4. wacer
5. oven
6. crack
7. fossil
8. sun
9. light
10. wind
11. car
12. energy

Source: Furlong & Schmidt, C.A.R.E., 1980

Do YOU know that . . .

...If you keep windows near the thermostat closed, you can save energy?

...If you have your oil furnace serviced once a year it could save you 10% in fuel consumption?

...If you wear one long-sleeved sweater, you add 2 degrees of heat, so can lower your thermostat and save energy?

...If our thermostats were lowered 6 degrees over a 24 hour period, 570,000 barrels of oil could be saved per day?

...If you set your air conditioner thermostat at 78 degrees instead of 72 degrees you can save from 12-47% cooling costs?

...If everyone raised their air conditioning temperatures 6 degrees we'd save 190,000 barrels of oil each day?

...If you lower your water heater setting 10 degrees you could save more than 6% of water heating energy?

...Every time you flush the toilet in the winter, you waste heat that has been absorbed in that water?

...For every pound of clothing you wear you can turn the heat down one degree?